BROOKLYN BOTANIC GARDEN RECORD

VOL. XXIV JANUARY, 1935 NO. 1

DELECTUS SEMINUM

BROOKLYN

1934

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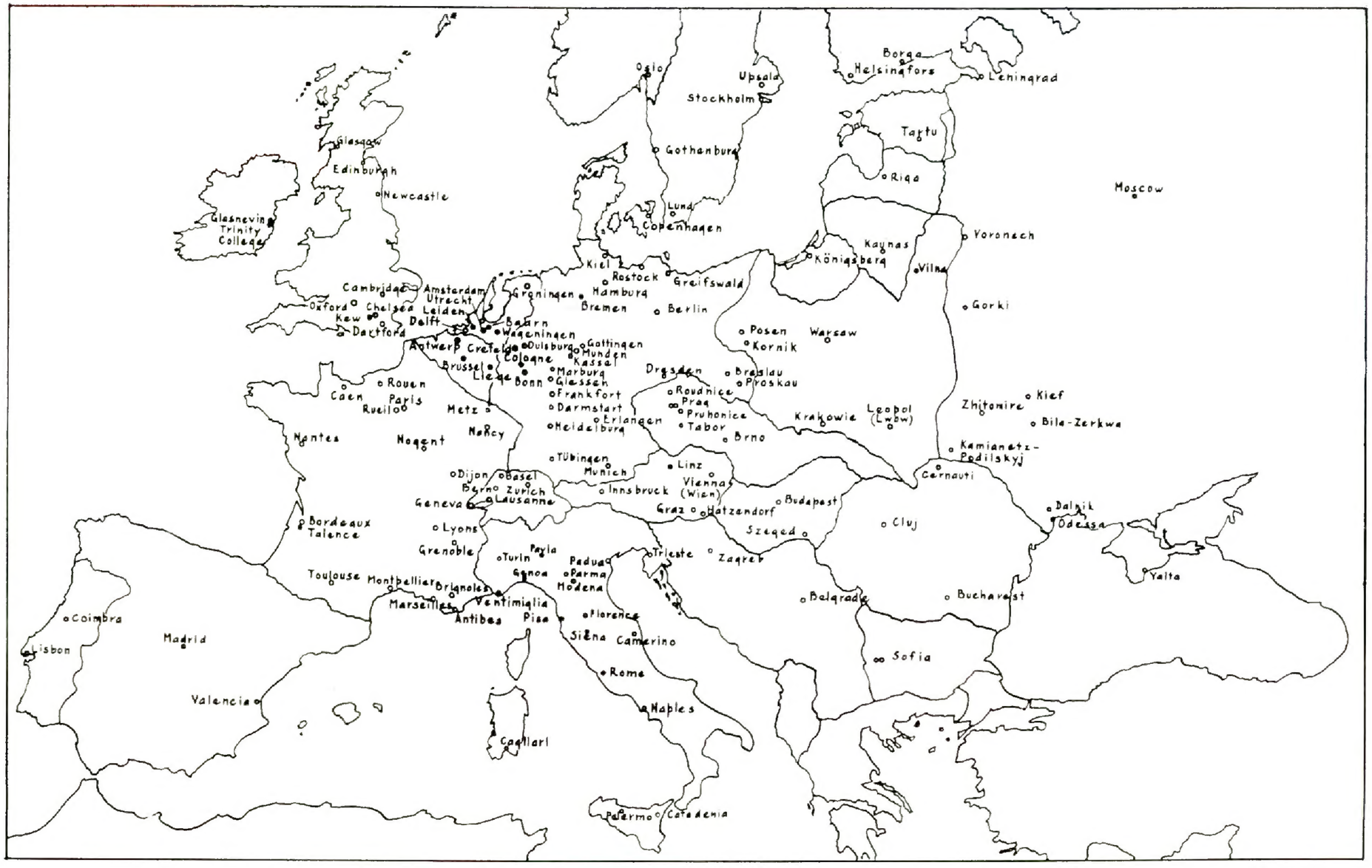

FIG. 1. Map of Europe showing, as of November, 1934, the location of botanic gardens from which Brooklyn Botanic Garden has received seed-exchange lists in recent years.

BROOKLYN
BOTANIC GARDEN
RECORD

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List of Seeds Offered in Exchange

These seeds, collected during 1934, are offered to botanic gardens and to other regular correspondents; also, in limited quantities, to members of the Brooklyn Botanic Garden. They are not offered for sale.

Please note that applications for seeds must be received during January or February. Seeds are mailed early in March. No seeds are available at other times of the year.

Seeds collected from wild plants are designated by an asterisk (*).

SEEDS OF TREES AND SHRUBS

Gymnospermae

Ginkgoaceae

Ginkgo
biloba L.

Taxaceae

Taxus
*canadensis Marsh.

Pinaceae

Picea
*canadensis B.S.P.

Cupressaceae

Chamaecyparis
*thyoides Britt.
Juniperus
*communis L. var. depressa Pursh
virginiana L.

Gnetaceae

Ephedra
distachya L.

Dicotyledones

Aceraceae 163

Acer
ginnala Maxim.

Anacardiaceae 153

Pistacia
chinensis Bge.

Rhus
*copallina L.
*glabra L.
*Toxicodendron L. (Poison Ivy)
*typhina L.
*vernix L. (Poison Sumac)

Annonaceae 98

Asimina
triloba Dunal

Aquifoliaceae 157

Ilex
serrata Thunb.
*verticillata (L.) Gray
Nemopanthus
*mucronata Trel.

Araliaceae 227

Acanthopanax
divaricatus Seem.
Henryi Harms
senticosus Harms

Berberidaceae 93

Berberis
canadensis Mill.
diaphana Maxim.
Gilgiana Fedde
koreana Palib.
x notabilis Schneid.
Poiretii Schneid.
Sieboldii Miq.
turcomanica Karelin var. integerrima Schneid.

Betulaceae 61

Betula
*populifolia Ait.
Carpinus
betulus L.
*caroliniana Walt.
Ostrya
virginiana K. Koch

Bignoniaceae 258

Catalpa
bignonioides Walt.

Cactaceae 210

Opuntia
tortispina Engelm.

Calycanthaceae 96

Calycanthus
fertilis Walt. var. ferox Rehd.

Caprifoliaceae 271

Diervilla
Lonicera Mill.
rivularis Gatt.
Lonicera
alpigena L.
Ferdinandi Franch.
Henryi Hemsl.
Maackii Maxim.
Morrowii A. Gray
muscaviensis Rehd.
quinquelocularis Hardw.
tatarica L.
Sambucus
*canadensis L.
Symphoricarpus
albus (L.) Blake (S. racemosus Michx.)
albus var. variegatus Blake
occidentalis Hook.
Viburnum
*acerifolium L.
*alnifolium Marsh.
*cassinoides L.
*dentatum L.
dilatatum Thunb.
dilatatum var. xanthocarpum Rehd.
*Lentago L.
prunifolium L.
Sieboldii Miq.
theiferum Rehd.

Celastraceae 158

Celastrus
orbiculatus Thunb.
(C. articulatus Thunb.)
scandens L.
Evonymus
americana L.
Bungeana Maxim.
oxyphylla Miq.
patens Rehd.
yedoensis Koehne

Cercidiphyllaceae 90a

Cercidiphyllum
japonicum Sieb. & Zucc.

Clethraceae 230

Clethra
acuminata Michx.
alnifolia L.

Compositae 280

Baccharis
halimifolia L.
Iva
*oraria Bartlett

Cornaceae 229

Cornus
*alternifolia L.
*Amomum Mill.
australis C. A. Mey.
*canadensis L.
*florida L.
gracilis Koehne
kousa Buerg.
*racemosa Lam.

Dilleniaceae 180

Actinidia
arguta Miq.

Ebenaceae 240

Diospyros
*virginiana L.

Elaeagnaceae 215

Elaeagnus
umbellata Thunb.

Ericaceae 233

Chamaedaphne
*calyculata (L.) Moench.
Enkianthus
campanulatus Nichols
perulatus Schneid.
subsessilis Mak.
Gaultheria
*procumbens L.
Oxydendrum
arboreum DC.
Xolisma
*ligustrina Britt.
Zenobia
pulverulenta Pollard

Ericaceae

Vaccinoideae 233a

Gaylussacia
*dumosa Torr. & Gr.
Vaccinium
*atrococcum Heller
*canadense Kalm
ciliatum Thunb.
*corymbosum L.

Euphorbiaceae 147

Sapium
sebiferum Roxb.
Securinega
flueggeoides Muell.

Fagaceae 62

Castanea
pumila Mill.
Quercus
*marilandica Muenchh.

Grossulariaceae 117b

Ribes
aureum Pursh
odoratum Wendl.
sativum Syme var. macrocarpum Bailey
triste Pall.

Guttiferae 187

Hypericum
aureum Bartr.
densiflorum Pursh

Juglandaceae 60

Platycarya
strobilacea Sieb. & Zucc.

Labiatae 254

Elsholtzia
Stauntonii Benth.

Lauraceae 102

Benzoin
*aestivale Nees

Leguminosae

Caesalpinoideae 127b

Gleditsia
triacanthos L.
Gymnocladus
dioeca K. Koch

Leguminosae 128

Acacia
Kettlewelliae Maiden
Amorpha
canescens Nutt.
glabra Poir.
virgata Small
Caragana
arborescens Lam.
Cladrastis
lutea K. Koch
Cytisus
x praecox Bean
Indigofera
Kirilowii Maxim.
Maackia
chinensis Takeda
Robinia
x Holdtii Beissn.
Kelseyi Hutchins.
neo-mexicana Gray
Pseudoacacia L.

Lythraceae 216

Lagerstroemia
indica L.

Magnoliaceae 95

Liriodendron
*Tulipifera L.

Malvaceae 175

Hibiscus
syriacus L.

Menispermaceae 94

Menispermum
canadense L.

Moraceae 64

Maclura
pomifera Schneid.

Myricaceae 57

Myrica
*caroliniensis Mill.
*Gale L.

Myrtaceae 222

Eucalyptus
Dalrympleana Maiden
gigantea Dehnh.

oreades R. T. Baker
pauciflora Sieber
radiata Sieber

Oleaceae 243

Chionanthus
virginica L.
Fontanesia
Fortunei Carr.
Fraxinus
longicuspis Sieb. & Zucc.
Ligustrum
acuminatum Koehne var. macrocarpum Schn.
x ibolium Coe
obtusifolium Sieb. & Zucc.

Pittosporaceae 118

Pittosporum
Tobira Ait.

Plantaginaceae 269

Plantago
Cynops L.

Polygonaceae 77

Polygonum
Aubertii L.

Ranunculaceae 91

Clematis
*virginiana L.
Zanthorhiza
apiifolia L'Hérit.

Rhamnaceae 169

Ceanothus
*americanus L.
Rhamnus
Frangula L.

Rosaceae 126

Exochorda
Giraldii Hesse var. Wilsonii Rehd.
Korolkowii Lav.
Potentilla
fruiticosa L.
Rosa
*carolina L.
Sorbaria
Aitchisonii Hemsl.
sorbifolia A. Br.
Spiraea
Billiardii Herincq
chamaedryfolia L.
japonica L.
x Margaritae Zabel
*tomentosa L.

Rosaceae

Pomoideae 126a

Aronia
arbutifolia L.
*melanocarpa Elliott
melanocarpa var. elata Rehd.
Cotoneaster
bullata Bois. var. floribunda Rehd. & Wils.
horizontalis Decne.
Malus
baccata Borkh.
Photinia
serrulata Lindl.
villosa DC.
Sorbus
*americana Marsh.
Stranvaesia
Davidiana Decne.

Rosaceae

Prunoideae 126b

Prunus
*maritima Marsh.
*serotina Ehrh.
*virginiana L.

Rubiaceae 270

Cephalanthus
*occidentalis L.

Rutaceae 137

Evodia
Daniellii Hemsl.
hupehensis Dode
Phellodendron
chinense Schneid.
japonicum Thunb.
Lavallei Dode
Ptelea
isophylla Greene
serrata Small
Zanthoxylum
americanum Mill.

Saxifragaceae 117

Hydrangea
cinerea Small
paniculata Sieb.
petiolaris Sieb. & Zucc.
Itea
virginica L.

Staphyleaceae 161

Staphylea
bumalda DC.
*trifolia L.

Sterculiaceae 178

Firmiana
simplex W. F. Wight

Styracaceae 242

Halesia
carolina L.
Pterostyrax
hispida Sieb. & Zucc.
Styrax
japonica Sieb. & Zucc.

Ulmaceae 63

Celtis
*occidentalis L.

Vitaceae 170

Parthenocissus
*quinquefolia Planch.
Vitis
*aestivalis Michx.

Monocotyledones

Liliaceae 338

Smilax
*glauca Walt.

SEEDS OF HERBACEOUS PLANTS

Dicotyledones

Amarantaceae 79

Alternanthera
sessilis R. Br.
Celosia
argentea L.
argentea chrysanthiflora
argentea Thompsoni
cristata L.
Froelichia
floridana Moq.
gracilis Moq.
Gomphrena
globosa L.
globosa var. carnea

Araliaceae 227

Aralia
*hispida Vent.
*nudicaulis L.

Capparidaceae 107

Cleome
graveolens Raf. var. violacea
spinosa Jacq.

Compositae 280

Ageratum
Houstonianum Mill.
Chrysanthemum
Parthenium Pers.
Parthenium var. "Golden Ball"
Parthenium var. "Silver Ball"
Erigeron
macranthus Nutt.
Helichrysum
bracteatum Andr.
Tagetes
lucida Cav.
patula L.
Zinnia
multiflora L.

Droseraceae 112

Dionaea
*muscipula Ellis
Drosera
*filiformis Raf.
*rotundifolia L.

Euphorbiaceae 147

Euphorbia
marginata Pursh
Ricinus
communis L.

Labiatae 254

Perilla
nankinensis Bailey
Salvia
Sclarea L.

Leguminosae 128

Dolichos
Lablab L.

Lobeliaceae 276a

Lobelia
*Dortmanna L.
tenuior R. Br.

Malvaceae 175

Hibiscus
militaris Cav.
Moscheutos L.

Nymphaeaceae 88

Nymphaea
ampla
August Koch
Bisset
Blue Bird
caerulea
capensis var. zanzibariensis
capensis var. zanzibariensis rosea
Col. Lindbergh
dentata var. superba
Emily Grant Hutchings
George Huster
Gov. Emerson
H. C. Haarstick
Henry Shaw
Hofgartner Grabner
Independence Pink
Janice
Jupiter
kewensis
marmorata

Minerva
Mrs. C. W. Ward
Mrs. E. D. Whittaker
Mrs. G. C. Hitchcock
O'Mara
Panama Pacific
Pink Pearl
R. A. Harper
Stella Gurney
Sturtevant

Polemoniaceae 250

Phlox
Drummondi Hook.
(salmon pink)

Portulacaceae 85

Talinum
patens Willd.

Ranunculaceae 91

Coptis
groenlandica (Oeder) Fern. (C. trifolia of auth.)

Scrophulariaceae 257

Antirrhinum
majus L.

Solanaceae 256

Nicotiana
Sanderae "Crimson King"

Verbenaceae 253

Verbena
venosa Gill. & Hook.

Violaceae 198

Viola
*lanceolata L.

MONOCOTYLEDONES

Alismaceae 315

Alisma
*subcordatum Raf.

Dioscoreaceae 343

Dioscorea
*villosa L.

Eriocaulaceae 330

Eriocaulon
*articulatum (Huds.) Morong.

Gramineae 319

Arundo
Donax L.
Miscanthus
sinensis Anderss.
sinensis var. gracillimus Hitchc.
sinensis var. zebrinus Beal

Liliaceae 338

Clintonia
*borealis (Ait.) Raf.
Lilium
philippinense Baker
Maianthemum
*canadense Desf.
Medeola
*virginiana L.
Polygonatum
*biflorum (Walt.) Ell.
Trillium
*undulatum Willd.
Uvularia
*perfoliata L.

SEEDS FROM IDAHO

Collected by Mr. F. B. Wood,
Woodacres, P. O. Box 675, Boise, Idaho

Allium
cernuum Roth.
Antennaria
rosea (Eat.) Greene
Calochortus
macrocarpus Dougl.
Camassia
Leichtlinii (Baker) Wats.
Castilleja
(red)
Delphinium
bicolor Nutt.
Menziesii DC.
Epilobium
(yellow)
Erigeron
compositus trifidus
(Hook.) Gray
Erythronium
(white)
Fritillaria
lanceolata Pursh
pudica (Pursh) Spreng.
Lupinus
(yellow)
Mimulus
Lewisii Pursh
Pentstemon
Cardwellii Howell
confertus Dougl.
Rattanii Gray
Phacelia
sericea (Graham) Gray
Phlox
longifolia Nutt.
Potentilla
villosa Pall.
Romanzoffia
sitchensis Bong.
Saxifraga
caespitosa L.
Silene
acaulis L.
Specularia
perfoliata L.
Synthyris
reniformis Benth.
Trollius
albiflorus Rydb.

Requests for seeds should reach us by March first at the latest Address:

SEED EXCHANGE,
Brooklyn Botanic Garden,
1000 Washington Avenue,
Brooklyn, N. Y.,
U. S. A

INTERNATIONAL SEED EXCHANGE

We include with this seed list a map indicating 135 European botanic gardens from which we have received seed lists in recent years. Another year we plan to include a map showing botanic gardens in other continents.

We would be glad to receive additions or corrections.

In the "Guide Illustré du Jardin Botanique de Dijon," 1925, M. Genty writes of "the too laconic and ephemeral influence of the annual seed-exchange catalogs," and envisages for the future "some sort of international federation among botanic gardens, which could not but have happy results for science and for world peace."

At present botanic gardens are largely regional and national. Many French gardens are laid out on the DeCandolle or Brongniart systems, British gardens on the Bentham and Hooker system, and German gardens on the Engler system. These differences are more or less reflected in the seed-catalogs and in the nomenclature of the various gardens.

The 1930 Cambridge Congress rejected, by about two-thirds majority, the proposal for "*nomina specifica conservanda.*" Will botanic gardens, then, change long established names such as *Pinus excelsa, Araucaria imbricata, Sequoia gigantea, Ananas sativus* and others? Are such changes desirable and necessary?—A. G.

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Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9-6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

64. Inheritance of resistance to loose and covered smut in hybrids of Hull-less with Early Gothland and Monarch oats. 28 pages. 1932.

65. Monographic studies in the genus Eleocharis—II. 34 pages. 1932.

66. Inheritance of resistance to loose and covered smut in hybrids of Black Mesdag with Hull-less, Silvermine, and Early Champion oats. 14 pages. 1934.

67. Inheritance of resistance to loose smut and covered smut in some oat hybrids. 11 pages. 1934.

68. Monographic Studies in Eleocharis—III. 13 pages. 1934.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 5. The Rock Garden. 28 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 53 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

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HERBARIUM OF
THOMAS J. DELENDICK

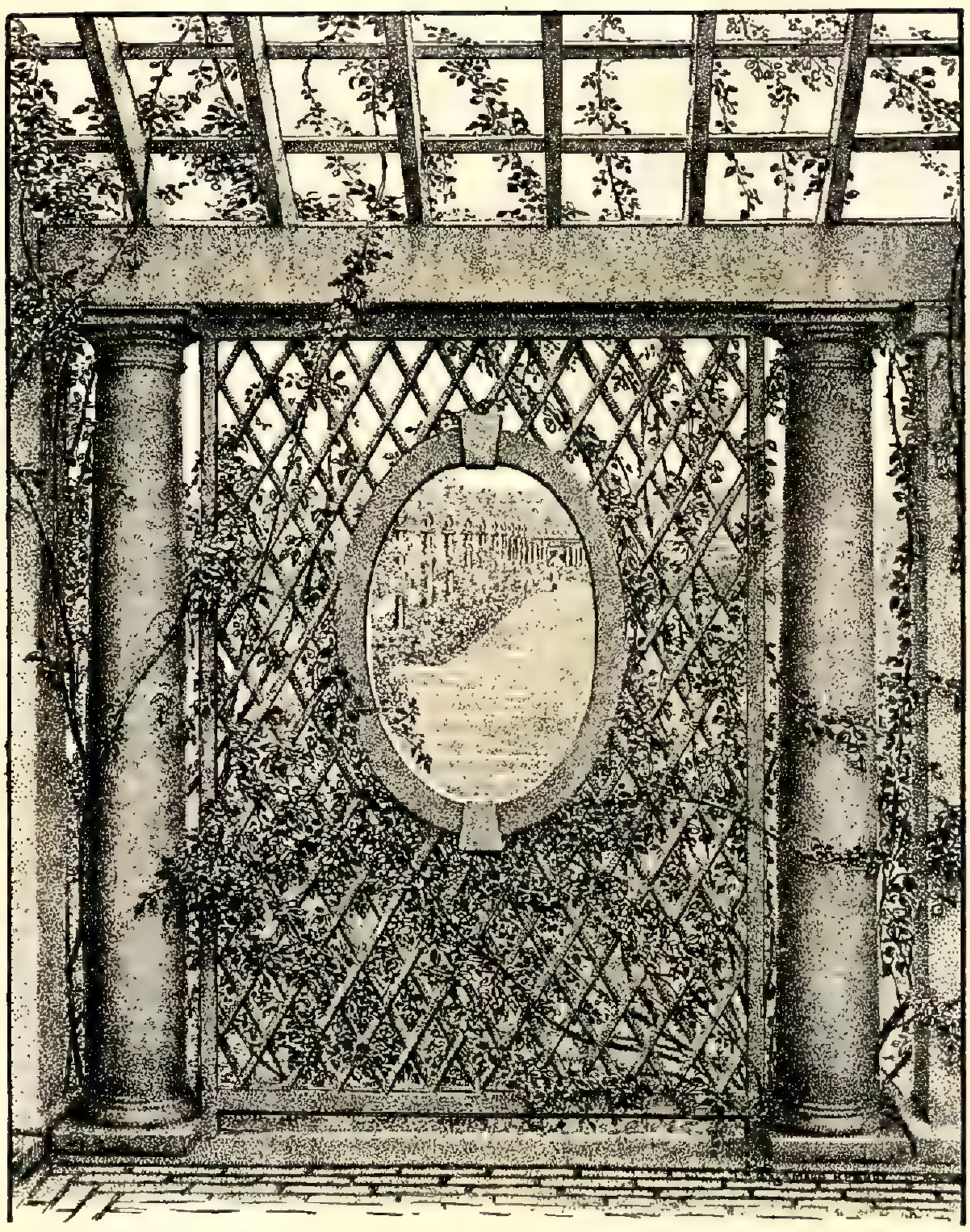
CONTAINING THE

TWENTY-FOURTH ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1934



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FRANCES M. MINER, A.B., *Instructor*
HESTER M. RUSK, A.M., *Instructor*
L. GORDON UTTER, M.S., *Research Assistant*

CHARLES F. DONEY, M.S., *Curatorial Assistant*
WILLIAM H. DURKIN, *Curatorial Assistant*
MARGARET BURDICK PUTZ, *Curatorial Assistant*
MARGERY H. UDELL, *Curatorial Assistant*
HILDA VILKOMERSON, A.B., *Curatorial Assistant*

LOUIS BUHLE, *Photographer*
MAUD H. PURDY, *Artist*

Administrative

DANIEL C. DOWNS, *Secretary and Accountant*
MAUDE E. VORIS, *Assistant Secretary*
NORMA STOFFEL BANTA, *Office Assistant*

MARIE-LOUISE HUBBARD, A.M., *Secretary to the Director*
FRANK STOLL, *Registrar and Custodian*

LAURA M. BREWSTER, *Stenographer*
PAULINE LEHMAN BROWN, B.A., *Stenographer*
CONSTANCE PURVES ELSON, B.A., *Stenographer*
EVELYN M. GAILER, *Stenographer*

THE BOTANIC GARDEN AND THE CITY

THE BROOKLYN BOTANIC GARDEN, established in 1910, is a Department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, and special contributions. Its articulation with the City is through the Department of Parks.

The City owns the land devoted to Garden purposes, builds, lights, and heats the buildings, and keeps them in repair, and includes in its annual tax budget an appropriation for other items of maintenance. One third of the cost of the present buildings (about $300,000) and of other permanent improvements (about $253,000) has been met from private funds.

Appointments to all positions are made by the director of the Garden, with the approval of the Botanic Garden Governing Committee, and all authorized expenditures for maintenance are made in the name of the private organization, from funds advanced by the Institute, which, in turn, is reimbursed from time to time by the City, within the limits, and according to the terms of the annual Tax Budget appropriation.

All plants have been purchased with private funds since the Garden was established. In addition to this, it has been the practice of the Garden, from its beginning, to purchase all books for the library, all specimens for the herbarium, all lantern slides and photographic material, and numerous other items, and to pay certain salaries, with private funds.

The needs of the Garden for private funds for all purposes, are more than twice as great as the present income from endowment, membership dues, and special contributions. The director of the Garden will be glad to give full information as to possible uses of such funds to any who may be interested.

INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1.	Annual member	$ 10
2.	Sustaining member	25
3.	Life member	500
4.	Permanent member	2,500
5.	Donor	10,000
6.	Patron	25,000
7.	Benefactor	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to seven carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through coöperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, Prospect 9–6173.

PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party (of not less than six), when visiting the Garden.
4. Admission of member and one guest to field trips and other scientific meetings under Garden auspices, at the Garden or elsewhere.
5. Free tuition in most courses of instruction; in other courses a liberal discount from the fee charged to non-members.
6. Invitations for self and friends to spring and fall "Flower Days," and to the Annual Spring Inspection.
7. Copies of Garden publications, as follows:
   a. RECORD (including the ANNUAL REPORT).
   b. GUIDES (to the Plantations and Collections).
   c. LEAFLETS (of popular information).
   d. CONTRIBUTIONS (on request. Technical papers).
8. Announcement Cards (Post Card Bulletins) concerning plants in flower and other items of interest.
9. Privileges of the Library and of the Herbarium.
10. Expert advice on the choice and care of ornamental trees, shrubs, and herbaceous plants, indoors and out; on planting the home grounds; the care of lawns; and the treatment of plants affected by insect and fungous pests.
11. Determination of botanical specimens.
12. Participation in the periodical distribution of surplus plant material and seeds, in accordance with special announcements sent to members from time to time.
13. Membership privileges in other botanic gardens and museums outside of Greater New York, when visiting other cities, and on presentation of membership card in Brooklyn Botanic Garden.

FORMS OF BEQUEST TO THE BROOKLYN BOTANIC GARDEN

Form of Bequest for General Purposes

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which said sum to be used for the educational and scientific work of the Brooklyn Botanic Garden.

Form of Bequest for a Curatorship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which sum to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the .....fellowship.

Form of Bequest for other particular purposes designated by the testator

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, to be used (or the income from which to be used) for the Brooklyn Botanic Garden *

.....

.....

* The following additional purposes are suggested for which endowment is needed:

1. Botanical research.
2. Publishing the results of botanical investigations.
3. Popular botanical publication.
4. The endowment of a lectureship, or a lecture course.
5. Botanical illustrations for publications and lectures.
6. The purchase and collecting of plants.
7. The beautifying of the grounds.
8. The purchase of publications for the library.
9. Extending and enriching our work of public education.
10. The establishing of prizes to be awarded by the Brooklyn Botanic Garden for botanical research, or for superior excellence of botanical work in the High Schools of the City of New York.

FIG. 1. Japanese Garden showing clipped Flowering Crab (*Malus floribunda*) in full bloom. May 7, 1934. (8579)

HERBARIUM OF
THOMAS J. DELENDICK

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXIV APRIL, 1935 NO. 2

TWENTY-FOURTH ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1934

REPORT OF THE DIRECTOR

TO THE BOTANIC GARDEN GOVERNING COMMITTEE:

I have the honor to present herewith the Twenty-fourth Annual Report of the Brooklyn Botanic Garden for the year 1934.

COOPERATION IN RECOVERY PROGRAMS

At the close of the Peloponnesian wars, about the middle of the fifth century B.C., Athens was suffering from post-war unemployment—a condition analogous to that which is almost universal now. To meet the situation, Pericles proposed a vast program of public works to be financed with government funds. These included the building of the Parthenon, and gave work and income, not only to day laborers and artisans, but also to architects and sculptors, including Ictinus, who designed the structure, and the famous Phidias, who supervised the work. According to Plutarch, every craft and industry was involved. We are told that hundreds of workmen, skilled and unskilled, including labor in transportation of materials, were employed for ten years or more on the Parthenon alone.

The historical account reads like a page from a metropolitan newspaper of 1933–34. It was the CWA of classic Greece. We may question the desirability of such a program of state socialism

extending over a period of more than ten years. But the beautification of Athens, with all it has meant to modern civilization, must be considered as some compensation (from our point of view, at least) for the distresses of the post-war "depression" in Athens.

The recalling of this history enables us to view, in illuminating perspective, the current events of our own time under the operation of the Civil Works Administration (CWA), Temporary Emergency Relief Administration (TERA), Public Works of Art Project (PWAP), and other "Administrations" of the "recovery" program, enriching our cities with works of engineering and of architectural and landscape beauty.

The Brooklyn Botanic Garden has benefited in various ways by cooperation with different governmental recovery projects, as follows:

EWB (Emergency Work Bureau).—Our cooperation with this Bureau during 1932 and 1933 has been recorded in the Annual Reports for those years. During 1934 a total of 11 men and 20 women have been employed in what is commonly referred to as "white collar" work in the library, herbarium, business office, and various curatorial departments. Some of the details of work accomplished are recorded in the appended departmental reports.

CWA (Civil Works Administration).—The most extensive and important project at the Garden under this bureau has been the completion of the grading, top-soiling, and most of the construction work on the North Addition, bringing it to a condition ready for planting by our regular gardening force.

The landscaping plan, by Mr. Harold A. Caparn, has had the approval of the Botanic Garden Governing Committee and the Art Commission of New York City.

The beginning of this project is recorded in detail in the *Report* for 1933, and need not be repeated here. The actual work began on February 5, 1934, when the soil was frozen to a depth of eight or ten inches or more, and snow was on the ground. It was difficult to work under such handicaps, with temperatures often below zero. However, men were being given work and wages, and the operations progressed more satisfactorily as spring advanced.

Everything possible was done by hand, even where machine tools would have made far more rapid progress. The landscape architect's perspective view of the ideal toward which we are working in this development was shown as the frontispiece of the 1933 Annual Report.

The project, supervised by Mr. Caparn, was under the general supervision of the office of the Borough Engineer, Mr. Frank J. Lynch.

The Garden is under obligations to Borough Engineer Lynch and his staff, and to Park Commissioner Moses and his staff, including Mr. F. H. Gross, Borough Director for Brooklyn. It is a pleasure to express here our appreciation of their cooperation.

The area is now ready for planting, except for the erection of four stone pillars for each of ten pergolas. The order for these pillars was placed before the end of the year and their delivery and erection are expected early in 1935. The area, when planted, will be known as the "Horticultural Section."

Wall Garden.—An important feature of the "Horticultural Section" will be the Wall Garden, begun and completed ready for planting in 1934. This feature lies against the Mt. Prospect Reservoir embankment, on the west side. It was necessary to build against this embankment a reinforced concrete wall (Fig. 2). In front of this the wall-garden wall was constructed partly of roughly rectangular stone blocks, and partly of glacial boulders, properly laid and with an abundance of topsoil between the stones and between the concrete wall and the outer wall. So far as we can ascertain, this, when completed, will be the only example of a wall garden in a public park or garden in America. Its total length is 385 feet.

Administratively, we must realize that an area, like the North Addition, of between three and four acres, intensively developed, will require the entire time of several men, including skilled gardeners, to care for it properly. When its planting has matured, it will be one of the most beautiful approaches to a public garden.

This development also makes it increasingly urgent that the entrance gate at Eastern Parkway be built as soon as possible. The architect's design for this gate has had the approval of the

FIG. 2. North Addition development. Wall-garden wall against Reservoir embankment, showing reinforced concrete retaining wall against which the stone planting-wall is being built. Facing south-west. June 14, 1934. (8606)

Botanic Garden Governing Committee and the Municipal Art Commission. The architects are McKim, Mead and White.

CWA–TERA Project.—Beginning as of May 1, the CWA "white collar" work was continued under the Temporary Emergency Relief Administration. The initial set-up was as follows:

TERA Project 89–Fd–374–X

To enable the Brooklyn Botanic Garden to recruit its staff so as to more effectively serve the public and to take care of necessary work which could not otherwise be done. The set-up was as follows:

	Clerks	Stenog.	Lib. Asst.	Lab. Asst.	Trans-lator	Drafts-man	Attend-ants	Photo. Asst.	Totals
Director	1	1							2
Secretary	1								1
Elementary Inst'n.	5								5
Public Instruction	3								3
Research				1	1				2
Herbarium	2			1	1	1			5
Horticulture							2		2
Membership		1							1
Custodian	1						3		4
Library	1		1						2
Photography								1	1
Totals	14	2	1	2	2	1	5	1	28

As of December 31, 1934, the set-up was as follows:

	Clerks	Stenog.	Lab. Asst.	Trans-lator	Attend-ants	Totals
Director	1					1
Secretary	1					1
Elementary Inst'n.	3					3
Public Instruction	2					2
Research			1			1
Herbarium	1		1	1		3
Horticulture					2	2
Membership		1				1
Custodian	2				3	5
Totals	10	1	2	1	5	19

It is a pleasure to report that the men and women assigned to this Project have not been engaged in so-called "made" work,

FIG. 3. Busts of botanists. Plaster models for casting in bronze, by Public Works of Art Project sculptors. Top: John Torrey (left), Asa Gray. Middle: Robert Brown (left), Gregor Mendel. Bottom: Darwin (left), Linnaeus.

but have been temporarily occupying positions which would be filled by permanent appointments if the Botanic Garden had sufficient funds. For the most part, the work has been of the nature commonly understood by the titles of the different positions.

PWAP (Public Works of Art Project).—"Provision for the encouragement of the fine arts has always been recognized as one of the functions of the Federal Government, and it is obvious that such provisions should be enlarged in time of depression. . . . We plan to find opportunities for this work in the embellishment of Federal Buildings with murals, sculpture, and craftsmanship, in similar work on state and municipal buildings financed by the Federal Government, and in other directions where the opportunity develops. . . . We realize the encouragement of art is a vital factor in our civilization." The quotation is from a statement issued in November, 1933, by Mr. L. W. Robert, Jr., Assistant Secretary of the Treasury.

In February, 1934, the Brooklyn Botanic Garden was asked if it had any art work that could be undertaken under the PWAP. Two projects were submitted and accepted, as follows:

a. Six Busts of Botanists.—The following subjects were chosen on the basis of the importance of their work, their local or national importance, and the availability of material (in the way of photographs, etc.) with which the sculptors could work. Six sculptors were assigned to this work, as follows:

Darwin. By Alexander Sambugnac.
Linnaeus. By Moissaye Marans.
Mendel. By Joseph D. Stott.
Asa Gray. By Guilio Novani.
Torrey. By Walter D. Plonski.
Robert Brown. By Carl L. Schmitz.

The plaster models, which have been approved by the Committee of the PWAP, were made in anticipation of being cast in bronze. In almost every case, it was difficult to get the most helpful material to work from—such as full face and profile views. Photographs of the six busts are reproduced on page 16.

b. Mural Design for the Ceiling of the Main Rotunda of the

Laboratory Building.—It was the original intention of the architects of this building (McKim, Mead and White) that the rotunda ceiling should some day be decorated. The preparation of this design was assigned by the PWAP authorities to Mr. Frank H. Schwarz, a member of the National Academy of Design. His design is reproduced below.

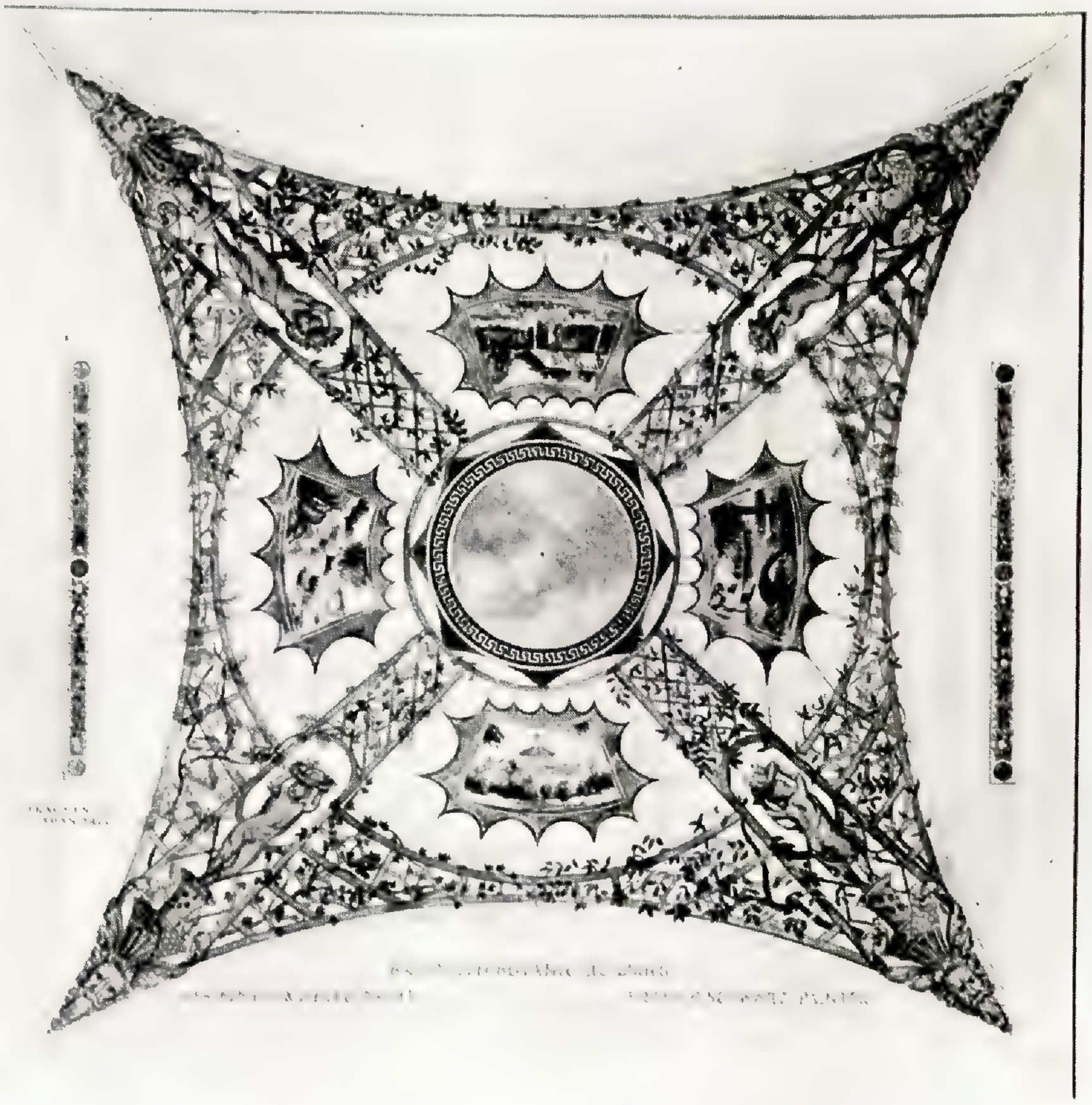

FIG. 4. Design for Mural for main floor rotunda ceiling. By Frank H. Schwarz, A. N. A. (8578)

RESEARCH

"We might just as well command the sun to stand still as to say that science should take a holiday." A recent newspaper editorial pointed out what it called the futility of continuing

scientific research with a view to more efficient crop yields and general agricultural production while, at the same time, the Agricultural Adjustment Administration (AAA) was instituting measures to reduce agricultural production. The above quotation is from Secretary of Agriculture Wallace's reply to that editorial, in which he showed, with admirable conciseness and force, that "research and adjustment march together." "Agriculture needs not less science in its production but more science in its economic life."

It was the Bishop of Ripon who, during the meeting of the British Association at Leeds, in 1927, first suggested that too much scientific investigation was in progress, and that research should take a holiday. Evidently, the Bishop lost sight of the fact that the urge to understand nature is as fundamental in some men, as the urge to art, or to business or religion, is to others. The result is pure science. It is to applied science, the utilization of the results of pure science, that modern business and commerce chiefly owe their methods, their efficiency (such as they have), and whatever measure of success they have attained. It is a truism that pure science, the pursuit of natural knowledge for its own sake, has been the chief liberalizer of the human intellect in all ages.

The research program of the Brooklyn Botanic Garden has been continued during the year 1934 along lines projected several years ago. Like every other human activity, it has been hampered by lack of adequate support, but nevertheless has made steady progress, and during 1934, as in preceding years, has made substantial contributions to our knowledge of plant life, both theoretical and practical.

The support of our project of plant disease resistance has been most generously continued, now for the 14th year. Some of the year's results have been embodied in two papers by Dr. Reed, who has also continued and extended his investigation of the botanical and horticultural problems connected with the genus *Iris*, with special attention to the Japanese iris and other beardless forms.

Dr. Svenson has continued his studies of the Local Flora, and this has also enriched the Local Flora Section of the Garden.

Some of the scientific results of Dr. Svenson's trip to the Galapagos and Cocos Islands on the Nourmahal expedition in 1930 have been brought together in a paper, the publication of which has been made possible by the pledge of a generous contribution from Mr. Vincent Astor. The paper will appear in *American Journal of Botany* for February, 1935. Dr. Svenson also reports progress (p. 70) in his studies of the complex genus *Eleocharis* and of the genus *Bidens* which includes the troublesome "Sticktights" of our local flora.

Dr. Graves reports progress in his study of the chestnut-bark disease. The object of this investigation is to produce, by hybridizing, a variety of chestnut (*Castanea*) hardy in the range of the American chestnut (*C. dentata*), resistant to the chestnut-bark disease or "chestnut blight," and valuable for timber.

Dr. Gundersen reports the continuation of his study of the relationship of plant families, with emphasis on placentation (the anatomy of ovule attachment) in the Dicotyledons. Dr. Benedict, resident investigator, has continued his cultures of ferns and their study. Dr. Cheney, also resident investigator, has continued his studies of the coffee plant along new lines of both economic and scientific interest; and Mr. Doney, assistant in the department of plants, has concluded his studies of the genus *Staphylea*—shrubs of the Bladdernut Family. The results are embodied in a thesis submitted to the faculty of Columbia University in partial fulfillment of the requirements for the M. A. degree.

Three research students have been registered at the Garden during the year (p. 58).

Detailed results of all these investigations are reported more fully on pages 50–72.

Of course the great need is additional support for research in the form of permanent endowment more nearly commensurate with its scientific and economic importance, and as a fundamental function of the Botanic Garden. This objective must be kept before us until the end is attained.

Public Relations

Attendance.—Turnstiles at the entrance gates registered a total attendance of 1,352,407, equal to almost half the population of

Brooklyn. As stated above, the increase over 1933 was 36,560.

The largest monthly attendance was 221,780 in May, and the smallest 46,663 in February. The largest weekend attendance was 23,071 on April 7–9. These figures are less than the maximum weekend attendance in 1933, owing chiefly, no doubt, to the fact that the Eastern Parkway gate was out of commission most of the year on account of grading operations on the North Addition.

Attendance from Out of Town.—Visits to the Garden by Garden Clubs and other organizations from other cities is now a commonplace, but special trips to Brooklyn from a distance by individuals for the express purpose of visiting the Garden rarely come to our notice. It was a real pleasure to receive last June a letter from a correspondent in California, not known personally, and formerly residing in Rochester, N. Y., reading as follows: "In other days my husband and I often took a night train for New York for one day in the Botanic Garden, especially in spring . . . so I thank you for inspiration that you are unconsciously giving to an unknown person."

Attraction of Cherry Trees.—One of the New York daily papers of May 15 carried an interview with the Captain in charge of the Telegraph Bureau of the Police Department in Brooklyn. The Captain is quoted as follows: ". . . right now we are receiving hundreds of calls from all parts of Manhattan and the Bronx asking directions to the Brooklyn Botanic Garden, where the Japanese cherry trees are now in blossom."

Bureau of Public Information.—Inquiries from the general public, outside the regular Garden membership, for information on all aspects of plant life and gardening, continue to be received in increasing number from individuals and institutions, from many states from coast to coast, and from many foreign countries.

Public Education

In his Presidential Address before the British Association for the Advancement of Science in 1933 Sir Frederick Gowland Hopkins said: "It is, however, because of its extreme importance for social progress that public ignorance of biology is especially to be regretted."

This is true with reference to the great liberalizing generaliza-

tions of biology such as biogenesis, evolution, the principles of heredity, the germ theory of disease. It is equally true with reference to ignorance of the facts of plant and animal life, including matters of crop-production, sanitation, hygiene, and public health. This is not to say that everyone should become an authority on some branch of biology, but that a general sympathetic interest in, and intelligent comprehension of, the main facts and principles of botanical and zoological science is of the highest social importance. The educational work of the Brooklyn Botanic Garden has been organized in recognition of this truth.

"Effectiveness Ratio" of our Educational Contacts.

A survey of the educational activities of forty-seven American museums has been made by Mr. Edmund Cooke, of the department of Education, Cleveland Museum of Natural History. His report, published in the *Museum News* for June 1, 1934, notes that, "Practically without exception museums are endeavoring to make their influence felt in the great public task of education . . . the museums have expanded and elaborated their educational activities to a greater extent than they have any other of their departments of work."

The "effectiveness ratio," or ratio of educational contacts to city population, for 31 museums located in both "large" and "small" cities (cities of over and under 250,000 population) varied from 5% to 265%, with the median at 12.6%. "This extreme variation is no doubt due, to some extent, to differences in accounting practices, but the writer does not believe that factor is large. More important is the fact that museums strive in different degrees to reach a large proportion of their constituency. They differ in resources, energy, and most of all in their conception of what their educational mission is. *Moreover, a very large city becomes in itself an obstacle to the fulfillment of that mission, however energetic the museum staff may be.*"

The author then refers to graphs showing that the *median* for the "small" city group is 18.4, while that for the "large" city group is only 7.9. We comment, in this connection, that most of our educationally aggressive museums are in "large" cities; this fact emphasizes the author's deduction that the very size of a

city may be an obstacle to its educational "effectiveness," quantitatively expressed.

For the Brooklyn Botanic Garden the "effectiveness," or ratio of educational contacts * to population, for 1934 was 37.9%, which is thirty points above the median for "large" city groups, as found in Mr. Cooke's survey. In figuring this ratio the population of the Borough of Brooklyn only, and not that of Greater New York, was taken. The figures were $\frac{1,035,406}{2,732,301} = 37.9\%$. The ratio of *attendance* to population for 1934 was $\frac{1,352,407}{2,732,301} = 49.5\%$.

In other words, the registered attendance figures were equal to nearly one half the population of the Borough, and the *educational contacts* (number of persons directly reached by the educational activities of the staff, not counting visitors who merely viewed the exhibits on the ground and in the conservatories) exceeded one third the population figures.

As Mr. Cooke states, "It is a little fatuous to attempt to measure the effect of museum [and botanic garden] education numerically." The quantitative statement is only one criterion by which the educational work may be judged. Effectiveness, as measured by results, is left wholly out of account.

Adult Education

Perhaps the greatest benefit a school can confer on a pupil is to give him such an intellectual impetus that, after "school days" are over, he will continue to advance along educational paths and to browse in educational fields so long as he has his faculties. It is the purpose of adult education to assist in this progress. Our museums and botanic gardens constitute, at once, great opportunities and potent stimulants and guides.

* The term "educational contact," as commonly used by museums, indicates the number of individuals *known to be directly reached or influenced* by the museum's organized educational activities. Thus if a loan collection is used by a teacher with a class of 50 that is counted as 50 educational "contacts." Theoretically, every visitor represents an educational contact, but actually mere attendance should not be so regarded, because the varied and often educationally irrelevant motives back of attendance are clearly recognized.

During 1934 twenty-two courses of instruction for adults have been given at the Garden with a total enrollment of 927 men and women. If we were to report this after the more usual method of museums, the statement would be that 329 lectures were given.

Broadcasting.—During the year 46 radio talks were broadcast, as follows: 15 over station WOR; 31 over WNYC.

Juvenile and Children's Work

Eleven courses, announced in the *Prospectus*, for boys and girls of high school and elementary school age were given in 1934. The enrollment was 725. Again following the common museum practice, there were 319 lectures with a total attendance of 46,383. In addition, 46 courses of six to eight sessions each were given by special arrangement with school principals, as announced in the *Prospectus*. Thus, more than 648 lectures have been given during the year. The total enrollment in courses was 1661.

Fun with the Microscope.—One of the great advantages of museums, not afforded by schools, is the opportunity they give, especially to young people, to browse. In the bird room of a museum, for example, there are found within four walls, easily and quickly accessible, opportunities which nature affords only at the effort and cost of long and expensive journeys to foreign lands. The zoological park affords even better opportunities of a similar sort. The plantations and conservatories of a botanic garden enable one, within limits, of course, to see the macroscopic plant world without the time and expense of long journeys. One may thus follow his own interest and enthusiasms—may come again as often as he likes. This process has transformed many a boy and girl into an enthusiastic student or even a great scientist. It was looking through a street-corner telescope, at the price of a nickel, that transformed a certain small boy into the great astronomer, Simon Newcombe.

It was with such thoughts in mind that we decided to offer an opportunity to older boys and girls to browse with the microscope. There is a whole world of life too small to be seen with the naked eye and, therefore, wholly unknown to most people. Moreover, the microscope makes fascinating revelations as to the finer details of structure of macroscopic objects—leaf hairs,

why the petals of flowers are velvety, how the tulip gets its color, etc., etc. Few schools have time or opportunity for such work as this, for everything must be directed toward the final examination. This work, called "Fun with the microscope" was offered for the first time in 1934 to a limited number of boys and girls as a special privilege or reward for having done work of superior merit in our other children's courses. The curator of elementary instruction reports that it was a great success from the standpoint of enthusiastic response and interest.

School Standards Raised by Botanic Garden Cooperation.—In his annual report to the City Superintendent of Schools, Mr. Emmanuel F. Van Dam, district superintendent for districts 25–27, Brooklyn, stressed the importance of proper environment in reducing the percentage of juvenile delinquency. Citing the unfavorable conditions in certain districts where the percentage is high, Mr. Van Dam continued:

"In contrast to these conditions are the districts of P. S. 138, 241, and 167 in the Eastern Parkway section. . . . The Brooklyn Botanic Garden, the Brooklyn Children's Museum, and Prospect Park, near by, afford opportunities for the enrichment of the curriculum. *In consequence, the academic standards and achievements of these schools are of the highest.*"

The Library

"A monastery without a library [*armarium*] is like a castle without an armory [*armentarium*]," was a current aphorism of the Middle Ages. To say that a library is equally indispensable to a botanic garden (as indeed to any scientific or educational institution) would be only to state a truism. But in the medieval monasteries the books for the library were largely made on the spot by unpaid monks in the scriptorium. Some books were obtained by exchange or gift.

While modern libraries are continually enriched by gifts and bequests, they are chiefly dependent on purchases. Here, as in other departments of an institution, the ideal condition is an endowment fund to insure a permanent annual income.

Statistics of School Service

	1934	*1933*
Conferences with Teachers		
No. of Conferences	93	127
No. of teachers involved	1,856	9,094
No. of pupils involved	84,100	209,000
Loan Lectures (Lantern Slides, etc.)		
No. of sets lent	39	38
No. of teachers involved	249	379
No. of pupils attending	13,573	19,034
Material Supplied		
Total number of requests from schools	474	609
Number of different institutions	204	196
High Schools and H. S. Annexes		
Brooklyn (Total No. 43)	21	28
Queens (Total No. 23)	7	9
Manhattan (Total No. 33)	8	13
Other Boroughs (Total No. 22)	6	9
Junior High Schools (Total in Brooklyn 22)	12	19
Colleges and Universities (Total in Brooklyn 7)	6	11
Elementary		
Brooklyn (Total No. 223)	84	60
Queens (Total No. 162)	4	3
Manhattan (Total No. 132)	2	3
Other Boroughs (Total No. 147)	3	2
Private and Parochial	24	19
Other Institutions	27	20
Number of potted plants for nature study	3,768	2,793
Number of Petri dishes filled with sterilized agar	1,154	4,858
Total number of teachers supplied with material	4,733	5,150
Total number of pupils reached	238,916	243,607
Living Plants Placed in School Rooms		
No. of schools	24	74
No. of plants	181	608
No. of teachers involved	221	756
No. of pupils reached	7,550	31,744
Plants Distributed (Raised in Classes)	28,479	21,764
No. of persons taking plants	1,297	1,202
Total number of schools represented	153	129
Seed Packets for Children		
No. of schools	581	381
No. of teachers	7,094	5,365
No. of pupils	283,732	214,395
No. of packets	851,115	643,178
Exhibits Provided		
No. of exhibits	22	21
Viewed by	93,730	550,085

Of the modest endowment of the Brooklyn Botanic Garden, only $23,917 has been specially designated for the Library, yielding an income in 1934 of only $1,250.30. This amount has been supplemented by $2,056.76 from other sources; but the small total amount available for publications in 1934 ($2,748.21) has made it necessary to forego the purchase of many essential publications, has made it impossible to take advantage of many real bargains in old and rare classics (important for us), and has provided for only a very small percentage of the binding that accumulates from year to year.

Notwithstanding this, the library has increased by 619 volumes, 644 pamphlets, and 5,366 parts of publications, obtained by gift, exchange, and publication, as well as by purchase, as reported on page 109. The library is now receiving 1,000 current periodicals, lacking three.

The number of users (4,200) was greater than for any previous year since the Garden was established. Compared to public library data these figures are, of course, not impressive, but it must be kept in mind that ours is a highly specialized library, restricted to reference. Its importance is determined by the character and quality of its service and not by quantitative results. Students and investigators are now continually finding in the Brooklyn Botanic Garden Library items they had searched for in vain in other accessible collections.

ALS of Robert Brown.—The gift of an "autograph letter signed" of Robert Brown is noted in the report on the library (p. 103) and deserves special mention here. As every botanist knows, Robert Brown, curator of the botanical library and herbarium of the British Museum, was one of the outstanding botanists of all time. During his lifetime (1773–1858) he was designated by Humboldt as "*facile botanicorum princeps, Britanniae gloria et ornamentum.*" In addition to his contributions to systematic botany he was, as all botanists know, the first to discover and describe the nucleus as an organ of the cell. This was almost exactly one hundred years ago (in 1833).

"I know no botanical writings at all comparable to those [of Robert Brown] on morphology, taxonomy and classification, for sagacity, profundity, range of knowledge, scrupulous accuracy

and clearness. . . . Every young botanist should go through a course of reading these miscellaneous works." So wrote Sir Joseph Hooker to Sir Francis Darwin in 1888.

The gift of this letter resulted from our correspondence with Mr. James Cummings, Town Clerk of Montrose, Forfarshire, Scotland. This town is the birthplace of Robert Brown and possesses a bust of the famous botanist. Through Mr. Cummings we obtained photographs of the bust to assist Mr. Schmitz, the sculptor of our bust. As a result of our inquiry concerning the possibility of securing a letter, Mr. Cummings corresponded with the Right Hon. Lady Lyell, of London, of the family of the great English geologist, Sir Charles Lyell, and through her good offices the letter was presented to the Brooklyn Botanic Garden by its owners, Lord Lyell and Hon. Lady Langman, son and sister-in-law, respectively, of Lady Lyell. Its scientific interest and value are greatly increased by the fact that it was addressed to Sir Charles Lyell, one of the founders of modern geology.

Plantations and Grounds

Flatbush-Brooklyn Patent Line

The original southern boundary of the Brooklyn Botanic Garden, was described in the Agreement of December 28, 1909, between the City of New York and the Trustees of the Brooklyn Institute of Arts and Sciences. This line coincided with the "patent line" or boundary between the old Township of Flatbush and the old City of Brooklyn. In 1909 the line was clearly indicated by an iron fence. When the so-called "South Addition," of about eight acres, was added to the Garden by the Amended Agreement of August 17, 1914, the southern boundary of the Garden was moved south to coincide with the northerly line of Malbone St., now Empire Boulevard. By the removal of the fence along the first boundary all indication of the Flatbush-Brooklyn Patent Line was obliterated within the Garden.

It seemed a matter of interest that this line should be clearly and permanently marked and, since the year 1934 is the centennial year of the incorporation of Brooklyn as a city, this seemed to be a logical time to do it. The line has been marked by a brass strip extending across the north-south paved walk on the west

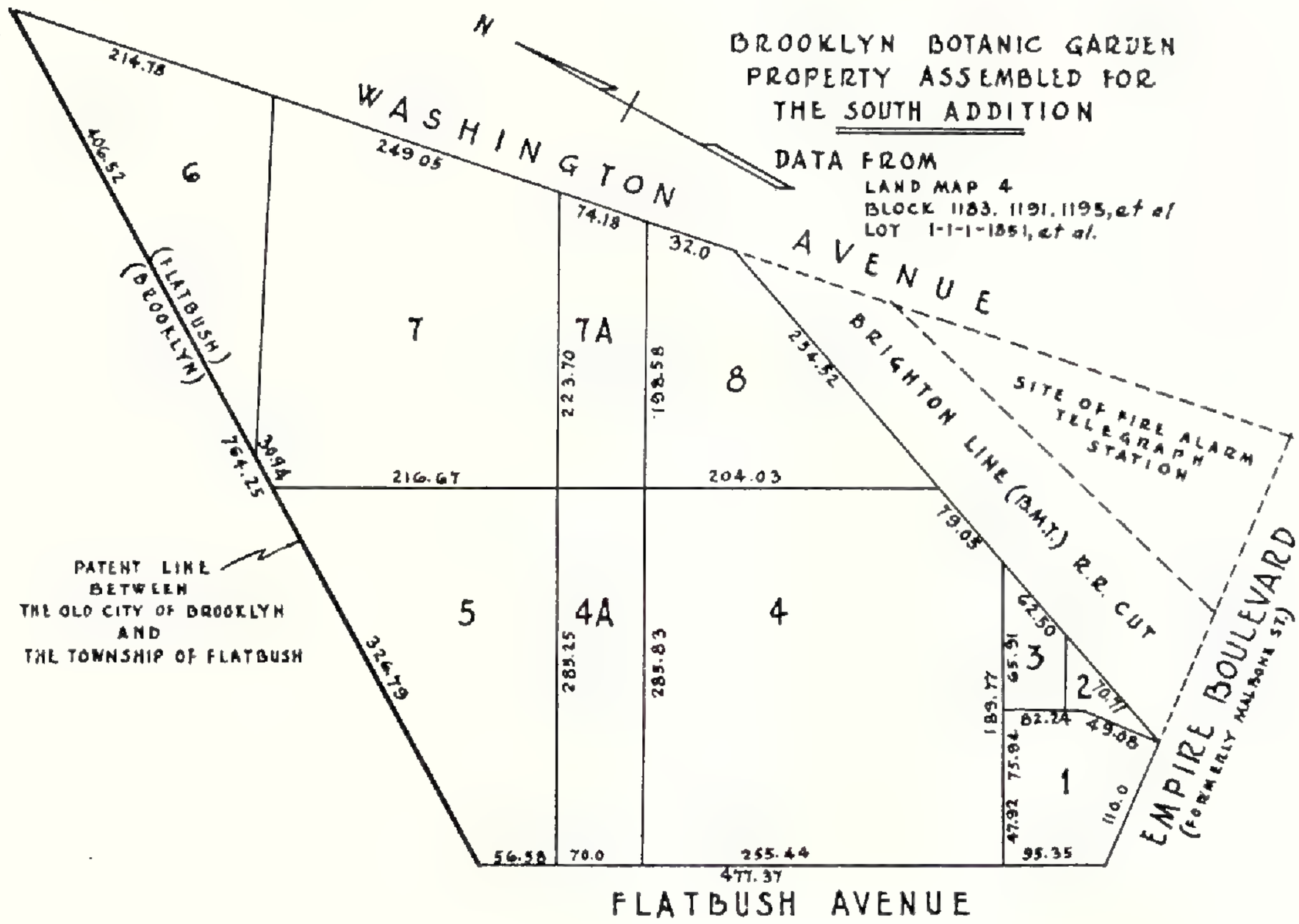

FIG. 5. Diagram of property assembled for the South Addition. (8704)

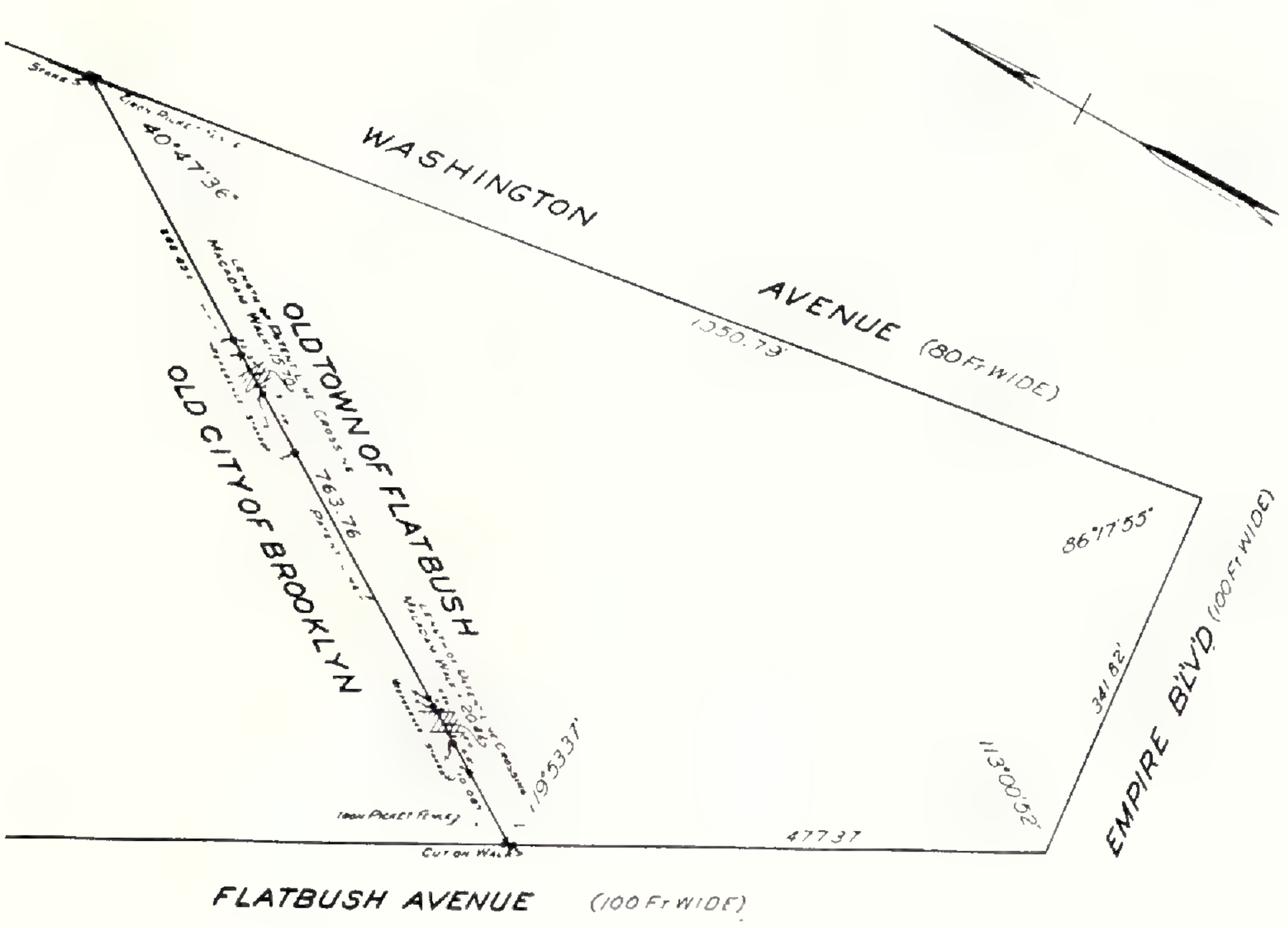

FIG. 6. Surveyor's map showing location of Patent Line between Township of Flatbush (right) and old City of Brooklyn. (8707)

side of the Garden, just south of the service gate on Flatbush Ave. The brass strip is securely imbedded in a concrete panel enclosed by narrower brass strips. A bronze tablet giving pertinent data has been affixed to a glacial boulder on the west side of the walk near the end of the patent line. A photograph of the tablet is reproduced as Fig. 8.

The work was planned and the tablet designed by the consulting landscape architect, Mr. Harold A. Caparn. The brass strip was set on December 20 and the bronze tablet on December 28 by the firm of John Thatcher and Son. The cost was met by contributions of members of the Garden.

The Garden is under obligations to the Department of Parks for having the line surveyed, and especially for the preliminary study of maps and records necessary in order to have the brass strip located as accurately as possible.

It is hoped that the small sum necessary to mark the patent line across the north-south walk along the east side of the Garden may become available during 1935.

Property Assembled in South Addition

Data concerning the acquisition and cost of the land comprising the South Addition are given in the Botanic Garden RECORD for November, 1932 (p. 296–298). Land Map 4 (Block 1183, 1191, 1193, 1195, et al.; Lot 1–1–1–1851 et al.) gives the boundaries of the parcels assembled in the area. Figure 5 is based upon this land map. These parcels were acquired by the City by condemnation proceedings, title vested April 25, 1904. The area was assigned to the Botanic Garden (as indicated above) ten years later (1914).

Figure 6 reproduces the map prepared by the Park Department Engineer's Office in 1934, preparatory to locating the patent line where it crosses the paved walks along the west and east sides of the Garden.

Figure 7 is a reproduction of a portion of the "Map of Five Cities of New York, Brooklyn, Jersey City, Hoboken, and Hudson City. Prepared by M. Dripps for Valentines Manuel [*sic*] of the Corporation of the City of New York 1860." Mt. Prospect Reservoir is clearly shown in the area marked "Proposed

Fig. 7. Portion of old map from Valentines "Manuel," 1860, showing site of "Proposed [Prospect] Park" and of Brooklyn Botanic Garden. See text (8657)

Park," which includes much, but not all of the present Prospect Park. Eastern Parkway, not in existence in 1860, now extends along the northern edge of the Reservoir. The trapezium-shaped area in which the Reservoir is located is the old "eastside lands," and the portion of this below the Reservoir is the original area (39 + acres) of the Botanic Garden. The street along the lower right-hand side of the trapezium is approximately along the boundary between old Brooklyn (to the left) and the Township of Flatbush (to the right), and indicates roughly the locus of the patent line marked by our brass strip in the walk. Two buildings are seen located in what is now the Garden on the Flatbush Ave. side. On the opposite side, Washington Ave. (not labeled on the map) is now prolonged southward until it meets Flatbush Ave.

Spring work on the grounds began about March 29, the season being one of the latest in the history of the Garden. In 1933 Crocus Day was on March 20, while this year the Crocus were at their best on Sunday, April 8.

Winter Killing, the most severe in the history of the Garden, is noted in the report of the Horticulturist, and the damage was reported in full in the Botanic Garden RECORD for July. Many fine shrubs that had been maturing in the Garden for 18–20 years were either killed or severely injured.

North Addition developmental work has already been recorded at the beginning of this report.

Favorable Weather.—Although the middle western states, during the summer, suffered from the worst drought since the U. S. Weather Bureau was established, there was an abundance of rain in Brooklyn, fairly evenly distributed. As a result our trees, shrubs, herbaceous plants, and lawns came through the season in excellent condition so far as growth and vigor are concerned.

Plantations

Special attention is called to the appended report of the Horticulturist (p. 95) concerning the various sections of the plantations, and especially to his statement of the need of additional men. Annually, for several years, additional areas have been brought under intensive development, resulting in more lawn to mow,

more beds to cultivate, and more trees and shrubs to care for, while at the same time, the trees and shrubs planted in the earlier years have come to pruning, spraying, and other care. And yet we have had no additional gardeners and only incidental and irregular additional unskilled labor for a number of years. Of course the proper standard of maintenance cannot be realized under such a serious handicap.

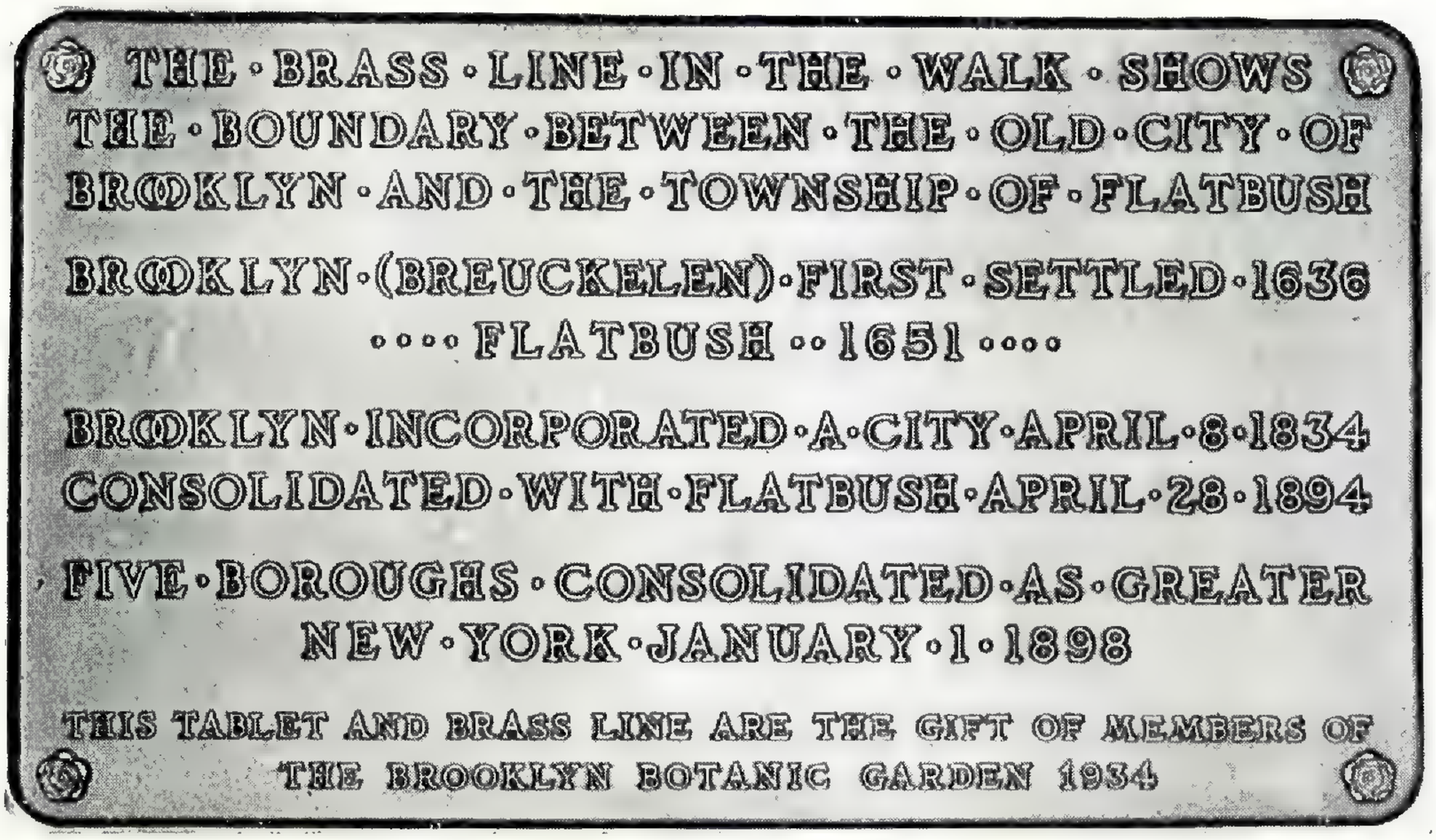
THE · BRASS · LINE · IN · THE · WALK · SHOWS
THE · BOUNDARY · BETWEEN · THE · OLD · CITY · OF
BROOKLYN · AND · THE · TOWNSHIP · OF · FLATBUSH
BROOKLYN · (BREUCKELEN) · FIRST · SETTLED · 1636
FLATBUSH · 1651
BROOKLYN · INCORPORATED · A · CITY · APRIL · 8 · 1834
CONSOLIDATED · WITH · FLATBUSH · APRIL · 28 · 1894
FIVE · BOROUGHS · CONSOLIDATED · AS · GREATER
NEW · YORK · JANUARY · 1 · 1898
THIS TABLET AND BRASS LINE ARE THE GIFT OF MEMBERS OF
THE BROOKLYN BOTANIC GARDEN 1934

FIG. 8. Bronze tablet giving data with reference to the "Patent Line" between Brooklyn and Flatbush. (8647)

THE WOMAN'S AUXILIARY

Members of the Auxiliary were of great assistance at the Botanic Garden exhibit throughout the week of the International Flower Show in March, and the Auxiliary, under the continued presidency of Mrs. Charles E. Perkins, had charge as usual of the social part of the annual Spring Inspection in May. The teas at the six Flower Days and at meetings of numerous clubs were also in charge of the Auxiliary. At the annual luncheon of the Auxiliary on February 7, 140 were present, and Dr. George M. Reed gave a non-technical account of his investigations with Iris and in plant pathology.

The membership work, in charge of Mrs. Whitney Merrill, has yielded very satisfactory results for these difficult times. One

hundred and four new members of all classes have been enrolled. These, with 193 removals, make a net loss of only 89. Very few organizations and institutions have held their own in membership during the past three or four years.

The two lectures given in the Auditorium under the auspices of the Auxiliary yielded a net total of $1650, which has been contributed to the Garden to help meet various urgent needs including the planting of the new Horticultural Section on the North Addition.

The lectures were as follows:

March 5. The miracles of nature. Mr. Arthur C. Pillsbury. Attendance, 570.

November 20. English gardens of the 17th and 18th Centuries. Mr. Gordon Dunthorne. Attendance, 600.

The Auxiliary now has 122 members. Their cooperation has been greatly appreciated.

Personnel

Dr. Henry K. Svenson, assistant curator of plants (1930–1932), associate curator of plants (1933–1934), was made curator of the herbarium to begin as of January 1, 1935.

Mr. Calvin W. Foss, librarian, was absent on sick leave during the year, as last year, Mrs. Emilie Perpall Chichester serving as library assistant in charge.

Miss H. Dorothy Jenkins, A.B., instructor since April 1, 1930, resigned to take effect as of September 1, 1934.

Miss Elsie Twemlow Hammond, M.A., who was assistant curator of elementary instruction at the Garden from September 1, 1921 to April 1, 1930, was appointed instructor in place of Miss Jenkins, resigned. The appointment took effect September 1, 1934.

Miss Carleen Maley, Cornell A.B., 1933, generously volunteered her services as assistant in the Department of Elementary Instruction from October 9, 1933 until May 10, 1934, leaving to accept a regular teaching position.

Mr. Charles F. Doney, who, since December 7, 1931, has been on the per diem payroll as assistant on part time in the depart-

ment of plants, with special reference to woody plants, was appointed curatorial assistant, beginning as of January 1, 1935. From October 5 to December 7, 1931, Mr. Doney very generously gave his time without compensation.

Mr. Victor Zalewski, a member of the per diem force of the Garden for twenty-one years, was taken seriously ill November 14, the day before the organization dinner, which he was planning to attend. His illness proved fatal on November 21. Mr. Zalewski was a most faithful and highly respected employee, and will be greatly missed by all.

Mr. Andrew B. Newell, janitor since October 1, 1928, died on December 7, following a serious major operation in Kings County Hospital. "Andrew" was an efficient and loyal employee, universally liked. He, also, will be greatly missed.

Mr. Samuel J. Hague, who has been employed by the Garden, during the open season, as general guard on the grounds since May 29, 1932, was appointed janitor beginning as of December 1, in place of Andrew B. Newell, deceased.

Personnel Dinner

The year 1934 marked the completion of twenty years or more of service of some eight members of the Botanic Garden personnel, as follows. The year after each name indicates the date when the appointment was made.

Members of Staff.—Miss Ellen Eddy Shaw, curator of elementary instruction (1913); Mr. Montague Free, horticulturist (1914); Dr. Alfred Gundersen, curator of plants (1914).

Other Members of Personnel.—Mr. Harold A. Caparn, consulting landscape architect (1912); John McCallum, labeler (1911); Martin Davitt, fireman (1911); John Juzwick, laborer (1913); Victor Zalewski, laborer (1913).

In recognition of these long terms of service an organization dinner was held on November 15, in the main floor rotunda of the Laboratory Building. Those present included officers of the Board of Trustees and of the Botanic Garden Governing Committee of the Board, the entire personnel of the Garden (and their wives), except three who were absent on account of illness. Appreciation of the services of each of those in the twenty-year class

was voiced by the director, and brief speeches of presentation were made by Miss Loines, Chairman of the Governing Committee. The occasion was altogether a most enjoyable one, seventy-two persons being present.

Membership

The membership record during the past five years of universal economic depression is about as satisfactory as could well be expected. The figures reported for membership during the past five years are as follows:

	Number	*Change*
1930	1113	−38
1931	1125	+12
1932	1231	+106
1933	1099	−132
1934	1032	−67

This encouraging record is due chiefly to the effective work of the Woman's Auxiliary, with Mrs. Whitney Merrill as membership secretary.

The needs created by a depression are physical and spiritual. Relief agencies are devoted to supplying the physical needs; they *must* be supported. Such institutions as botanic gardens minister to the spiritual needs; they *should* be supported by those able to do so. That the figures of general attendance equal almost half the population of Brooklyn, and that the figures were 36,560 in excess of 1933 leave no doubt of the fact that the public needs and wants the Botanic Garden. Membership, therefore, may be considered not only from the standpoint of personal benefit but also from that of civic opportunity.

Plant Distribution to Members, which tends to become more popular each year, is reported by the Horticulturist (p. 101).

Nine courses of instruction were offered free and one course at reduced rates.

Flower Days, primarily for members and their friends, are reported in full by the curator of public instruction (p. 76). Their popularity is reflected by the reported average attendance for the six "Days" of slightly over 237, a total of 1425.

Exchange of Membership Courtesies

By correspondence, arrangements have been made with a number of botanic gardens and museums in other cities by which officials and members of Brooklyn Botanic Garden, when visiting in those cities, may enjoy, without payment, full privileges which those institutions extend to their members. We, in turn, offer such privileges to their members when in Brooklyn. The first announcement of this plan was published in the Botanic Garden RECORD for October. To date the following 18 have authorized us to list them as cooperating institutions:

Academy of Natural Sciences, Philadelphia, Pa.
Boston Society of Natural History, Boston, Mass.
Buffalo Museum of Science, Buffalo, N. Y.
Carnegie Museum, Pittsburgh, Pa.
Charleston Museum, Charleston, S. C.
Everhart Museum of Natural History, Science and Art, Scranton, Pa.
Fairbanks Museum of Natural Science, St. Johnsbury, Vt.
Field Museum of Natural History, Chicago, Ill.
Massachusetts Horticultural Society, Boston, Mass.
Missouri Botanic Garden, St. Louis, Mo.
Newark Museum, Newark, N. J.
New York State Museum, Albany, N. Y.
Peabody Museum of Archaeology and Ethnology, Cambridge, Mass.
Pennsylvania Horticultural Society, Philadelphia, Pa.
Philadelphia Commercial Museum, Philadelphia, Pa.
Southwest Museum, Los Angeles, California.
The Berkshire Museum, Springfield, Mass.
California Academy of Sciences, San Francisco.

TWENTIETH ANNUAL SPRING INSPECTION

The Twentieth Annual Spring Inspection was held, as usual, on the second Tuesday of May, which fell on the eighth. The attendance was approximately 800. The weather was all that could be desired, and the Woman's Auxiliary and members of the Junior League cooperated to make the social part of the Inspection an entire success.

The itinerary of the Grounds included inspection of the new Equation of Time Tablet on the Armillary Sphere, by which standard time may be calculated from the Sun Dial time; the Bronze Tablet on the north post at the entrance to the Laboratory Plaza, acknowledging the Woman's Auxiliary gift of $1,502

for the planting of the Plaza; Cherry Walk, the trees being in full bloom but showing some injury from the unusually severe winter of 1933–34; the North Addition, showing the progress of the CWA work; and the Local Flora Section, with additional planting since the year before.

While tea was being served the following exhibits were on view:

1. Old Prints of English, French, Italian, and Dutch Gardens, about 50 in number, dating from the 17th and 18th Centuries, including the Oxford Botanic Garden in 1675 and 1733, and other Oxford gardens, exhibited by courtesy of Mr. Gordon Dunthorne, of Washington, D. C.

2. Photographs of Flowers and Gardens, about 50 in number, exhibited by courtesy of Mr. Paul S. Davis, of Boston, Massachusetts.

3. Models of Busts of Noted Botanists, referred to on page 17.

4. Design for a mural on the ceiling of the main floor rotunda of the Laboratory Building. See p. 18.

5. Two Terminal Figures—Winter and Summer. Models by Isabel Moore Kimball, sculptor. Presented to the Garden on March 6, 1934, by Miss Kimball.

6. A collection of Seeds of 100 or more native wild flowers, with paintings of the seeds and of the plants in flower. The collection and paintings were made by Mrs. Clarence R. Hyde, a member of the Woman's Auxiliary, and were exhibited by her courtesy.

Cooperation

In addition to our cooperation with various relief administrations, special mention should be made of the following:

Department of Parks

Naming of Trees.—In ancient Rome during the period of greatest luxury, we are told that a censor deprived an elector of his vote because his garden was negligently cultivated. Mayor LaGuardia, of New York, is a modern example of a similar lively appreciation of the value of plant life in a city. Addressing the annual convention of the American Association of Nurserymen last July, the Mayor is reported to have said: "New York City has planted more trees since January 1 than any other city in the

history of the world." Asserting that we have passed the stage where flowers, trees, and parks are regarded as luxuries, he said: "They are now absolute necessities and we are going to put a tree every place in this city where we can stick one." This statement reflects the far-seeing and progressive plans and accomplishment of our efficient Commissioner of Parks, Mr. Robert Moses.

It has been a pleasure for the Brooklyn Botanic Garden to respond, through Dr. Graves, to the request of the Park Department for cooperation in naming the larger and more important trees in the City. The trees thus serve educational as well as aesthetic ends. A report of this cooperation is given by the curator of public instruction on page 79. The Garden has also acted in an advisory capacity with reference to the question of continuing, or otherwise, the conservatories in Central Park.

The Garden has advised the Engineer of the Department of Parks with reference to different species of plants for decorative planting in the parks.

Washington Avenue Sidewalk.—Owing to previous changes in grade of the roadway of Washington Ave., the sidewalk on the west side, along the Botanic Garden frontage, has for several years been below the level of the ground on either side, so that during heavy rains and especially during the melting of snow the walk became the bed of a stream, making foot traffic difficult. This condition had been pointed out to previous administrations. In June it was brought to the attention of Park Commissioner Moses. The work of regrading and relaying the walk was begun in July under the supervision of Mr. W. H. Latham, Park Engineer, and largely completed on August 24. The final grading operations were done by our own men.

Exchange of Plants.—The appended report of the Horticulturist records our supplying the Department of Parks with propagating material of different varieties of Waterlilies sufficient to make 2600 divisions or plants. These were used in the lower lake in Central Park, where the boating of former years has been discontinued by Commissioner Moses.

On October 10 we received, in exchange, from the Department,

60 potted plants and about 100 cuttings of *Sedum*. These became available in connection with the dismantling of the Central Park Conservatories, which have been discontinued and taken down.

Other Organizations

Department of Public Welfare: Works Division, New York City.—In October, the Garden responded to a request of the Engineer of the Department of Standards of this Division for an analysis of the purity and germinating power of samples of lawn grass seed submitted by various vendors in connection with bids. This we were able to do by the generous cooperation of Jessie G. Fiske, State Seed Analyst of New Jersey. The analysis took several weeks, and the report was forwarded on December 21.

New Jersey College of Agriculture Extension Service.—During 1934, for the third season, the Garden has cooperated with the Extension Work in Agriculture of this College in radio broadcasting. The U. S. Department of Agriculture is also cooperating. Mr. Free and Miss Shaw, representing the Garden, have served on the staff of broadcasters over station WOR. In this connection a Radio Garden Club has been organized, extending into Canada and the District of Columbia, and over 18 states, as follows: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, South Carolina, Georgia, Indiana, Illinois, Michigan and Wisconsin. During 1934 the fan mail in connection with the program has amounted to 400 letters. Mr. Free has given 12 broadcasts and Miss Shaw two. These 14 broadcasts are listed, with others, on page 137.

A letter of October 3 from the station contains this statement: "We feel that the Radio Garden Club has derived a tremendous amount of benefit from its connection with the Botanic Garden, and that by working together in this fashion we have been able to offer our radio audience information of great practical value."

New Jersey State Museum, at Trenton, held an exhibit of "Plant Forms in Ornament," May 20 to June 18. At their request, the Garden loaned living plants of *Kleinia repens*, *Onoclea sensibilis*, species of *Cacti*, and *Mimosa pudica*.

United States Botanic Garden.—At the second session of the

73rd United States Congress, April 19, 1934, Congressman Kent E. Keller, Chairman of the House Committee on the Library, introduced House Joint Resolution 327, authorizing the appointment of a "Planning Committee in connection with the United States Botanic Garden, and for other purposes." Under the terms of this resolution twenty citizens, including the Director of the Brooklyn Botanic Garden, were named as members of this Committee. Under date of July 30, 1934, Congressman Frederic A. Delano, of New York, nominated in the Resolution as Chairman of this Committee, addressed a communication "To the Members of the Planning Committee of the United States Botanic Garden." This communication announced the naming of the following subcommittees:

Location and Size: Chairman, Hon. Frederick A. Delano, M.C.

Scope and Function: Chairman, Mr. B. Y. Morrison, Head of the Division of Foreign Plant Introduction, Bureau of Plant Industry, Department of Agriculture.

Administration and Correlation: Chairman, Prof. H. H. Bartlett, Director of the Botanical Garden and Arboretum, University of Michigan.

Education and Public Relations: Chairman, Dr. C. Stuart Gager, Director, Brooklyn Botanic Garden.

Legislation: Chairman, Hon. Kent E. Keller, M.C.

Mr. John C. Bradley, Secretary to Congressman Keller, will serve as Vice Chairman of the Committee in the preparation of the report, in order to compile and edit the report which will be made up for deliberation by Congress.

American Rock Garden Society.—Mr. Free, the first president of this new organization, records its first annual meeting at the Brooklyn Botanic Garden in his report (p. 102).

National Rose Garden.—Mr. Free reports (p. 102) his trip to Washington to confer as member of a committee on the project to establish a National Rose Garden in the District of Columbia, possibly under the auspices of the American Rose Society.

International Flower Show.—An account of our four exhibits at the 1934 show, Grand Central Palace, is given by the horticulturist on page 99. As a result of these exhibits, we received 40 clippings of news items and editorial mention in newspapers and

in horticultural and society magazines. It is estimated that our exhibits were viewed by approximately 130,000 persons. About 7000 copies of a four-page *Leaflet* describing the exhibit, and about 2400 copies of an eight-page *Leaflet* on the subject of the main exhibit (Methods of Pruning) were distributed. Our exhibits were planned by Mr. Free and installed under his supervision. The director of the Garden continued during 1934 as a member of the International Flower Show Committee.

Horticultural Society of New York.—The director has continued, for the seventh year, to serve as a member of the Board of Trustees of this Society. Dr. Svenson, of the Garden staff, has, for the third season (since 1932), given an afternoon course of instruction at the rooms of the Society, and Mr. Free lectured before the Society on January 17.

Department of Botany of the Brooklyn Institute of Arts and Sciences.—For nine years (since October 19, 1926) this organization has held its opening fall meeting in the Laboratory Building of the Garden. By an arrangement entered into in September, 1934, the Department will hold all of its regular meetings at the Garden until further notice. Dr. Graves reports two meetings (November and December) held in 1934.

The School Garden Association of New York.—The fifth annual meeting of delegates from the thirty-six school gardens conducted by this Association during the summer in Brooklyn was held at the Botanic Garden on November 19. These delegates are now called "nature curators."

Columbia University, College of Pharmacy, held an exhibit of scientific pharmacy from May 28 to June 2. At the request of the College the Garden loaned for the exhibit 31 potted plants in eight species, one uprooted plant, and 11 cut specimens in 11 species.

New York Botanical Garden.—Dr. E. D. Merrill, director of this Garden, extended to our "unemployed" and other gardeners the courtesy of free enrollment in the courses for gardeners being given by the New York Garden at the rooms of the Horticultural Society of New York. Two of our regular employees took advantage of this opportunity.

Arthur Hoyt Scott Horticultural Foundation.—During the summer of 1934 Mr. John C. Wister, director of this Foundation,

FIG. 9. Brooklyn Fall Flower Show exhibit of the Brooklyn Botanic Garden. Sept. 26, 1934. (8642)

located at Swarthmore, Pa., sent us 63 rhizomes of 29 varieties of Bearded Iris. Most of these varieties are comparatively new, and hence somewhat expensive. Mr. Wister also obtained for us 47 rhizomes of 17 varieties of Bearded Iris from Mrs. Z. G. Simmons, Greenwich, Conn. In exchange, we sent to the Scott Foundation, in March, 50 varieties of Japanese Iris and 14 varieties of Siberian Iris.

Long Island University.—In October Mr. Free, on request, visited this University and gave suggestions as to what shrubs would be best for planting in the University grounds.

Hospitals.—As during previous years, the Garden offered a course of lectures and field trips (in the plantations), with special reference to medicinal plants, to the classes of Student Nurses in three Brooklyn Hospitals—Kings County (municipal), Prospect Heights and St. John's (both private endowments). Dr. Graves reports more fully on this (p. 75).

Brooklyn Fall Flower Show.—The Garden installed a very attractive educational exhibit of cacti and other succulents at the Brooklyn Fall Flower Show, held in the 14th Regiment Armory September 25–29. In this connection printed matter concerning the Garden was distributed. At the close of the show the authorities presented to the Garden 100 Cedar trees suitable for poles. Mr. William T. Hunter, member of the Botanic Garden Governing Committee, kindly placed at our disposal a truck of his firm (A. Schrader's Son, Inc.) to bring the trees and the exhibits back to the Garden.

Miscellaneous.—Cooperation has been continued with the Board of Education of New York City, as more fully recorded elsewhere in this report; with the Botanical Society of America, the Ecological Society of America, and the Editorial Board of Genetics in the publication of the official Journals of those organizations; the American Iris Society in continuing the Test Garden for Beardless Iris; the American Fern Society, of which our Dr. Svenson is treasurer, in connection with the business management of the *American Fern Journal*, edited by our Dr. Benedict; the State Institute for Applied Agriculture on Long Island, as noted by Dr. Reed in his report on page 58; and the forty-seven organizations that have held meetings at the Garden, as listed on pages 139–141.

Inter-Institutional Membership Courtesies.—The exchange of membership courtesies between Brooklyn Botanic Garden and various other botanic gardens and museums is mentioned in detail under the heading "Membership," on page 37.

Gifts

A list of donors and gifts is given on pages 118–126 of this Report. The gifts, as received, have all been acknowledged with the thanks of the Botanic Garden Governing Committee. It is one of the gratifying features of the preparation of this Report to make public acknowledgment of the gifts and to give renewed expression of appreciation to the donors. In difficult times like these, contributions to educational and scientific institutions are evidence, not only of public spirit and generosity, but also of a realizing sense of the fact that the advancement and diffusion of knowledge are not the least of human necessities. Men do have intellectual and spiritual as well as physical needs.

Twenty-fifth Anniversary

During December the Governing Committee and the Staff took cognizance of the fact that during 1935 the Brooklyn Botanic Garden will complete the first quarter century of its actual existence, since it was in 1910 that the land was turned over to the Trustees of the Brooklyn Institute of Arts and Sciences to administer as a Botanic Garden, and on July 1, 1910, the first appointment to the Garden personnel took effect. Plans were initiated in December for the celebration of this anniversary by appropriate functions during the usual week of the Annual Spring Inspection, May 13–16.

Financial

Such financial reverses as the Brooklyn Botanic Garden has suffered during 1934 are difficult to meet. They mean economies which lessen efficiency; they mean retrenchment when the whole situation calls for healthy growth and expansion; they mean economies which spell extravagance; they mean savings which involve losses and impoverishment. But, realizing all this, we keep in mind the encouraging fact that botanic gardens tend to persist, that prosperity, like light, normally comes in waves, so

that crests always follow troughs or depressions—at least they always have.

But if this economic depression, from which the crippled world is now trying to emerge, has emphasized one thing more than another for the administrators of scientific and educational institutions it is the necessity for generous endowment funds conservatively invested. It may seem logical that each generation should finance its own institutions, as a well known philanthropist recently urged, but when the economic structure of the civilized world is endangered, institutions that depend largely on the annual contributions of generous donors are not the least nor the last to suffer. And so we must keep the need of an adequate endowment fund in mind as our most urgent as well as most fundamental need.

Increase in Public Gifts

According to an analysis published in 1934 philanthropic gifts "presumably made from current income" increased about 44 per cent. for the first six months of the year over the corresponding period in 1933 in six large American cities. The amounts for the two years were $19,868,975 in 1934 vs. $13,747,320 in 1933. The totals for three major purposes were as follows:

	1933	*1934*
Organized Relief	$9,986,722	$8,248,956
Education	1,004,252	5,588,944
Fine Arts	354,988	1,792,730

From these figures it is seen that the contributions for Relief fell off $1,737,766, while those for Education and Fine Arts increased by $4,584,692 and $1,437,742, respectively. It is interesting (and disappointing) to note that, in such an analysis, including health, play, reform, and religion, besides the three mentioned above, science education (*e.g.* museums) and scientific research are not even mentioned, although we are often said to be living in a preeminently scientific age. However, substantial gifts are being made to both scientific research and education, and the general increase in philanthropic giving for other objects than relief is some indication that we have made a start toward recovery from the depression.

Public Interest in and Support of Science and Art

Cost of Science Education

In our preceding annual report we called attention to a 1932 report of the U. S. Office of Education that the combined public and private support of science education through science museums, in 1930 in the United States, was less than two thirds that of art education through art museums.

An analysis of data taken from the *IIandbook of American Museums* for 1932 indicates that fourteen science museums, widely distributed throughout the United States, had in 1930 a total attendance of 8,050,833. The budgets of these institutions total $3,668,292.00. Dividing the budget figures by the attendance figures, it appears that the total cost per visitor, for 1930, for science museums is 45½¢.

Cost of Art Education

In a similar way, it appears that the total cost per visitor for twenty-one art museums, for 1930, was $1.58 per visitor. In these institutions, there were included no children's museums, no history museums, no mixed (science-and-art) museums. There were included, for both science and art, the largest museums of the country. The choice was otherwise made primarily with reference to securing a wide geographical range.

The endeavor was also made to choose museums of comparable budgets, but in the art museums one institution was included with a budget of only $2500. This would tend, of course, to bring down the average for art museums. The lowest budget for any of the science museums was $14,077.

The attendance figures suggest that there is a much wider public interest in science museums throughout the United States than in art museums.

The budget figures suggest that there is a greater interest in art museums among persons of large wealth, since by far the larger proportion of the financial support of both types of museum is derived from private funds, including annual contributions and endowment derived by bequests and gift, rather than from appropriations by any branch of the government.

To quote from our preceding report, "the large fortunes out of which art has been so generously endowed were made possible, in large part, by scientific research and invention. Few fortunes have been made by art. Art is endowed by science. Science is endowed by art, but not financially." The support of art should not be diminished; but the contributions of science to modern life justify a much more generous financial support both by government and by private philanthropy.

Collections Fund

The annual Collections Fund was instituted initially to provide means for the purchase of plants and publications for the library, and for the enrichment of the herbaria and other collections (whence the name of the fund). For all of these purposes the Garden is wholly dependent on private funds. During 1934 it was necessary (with the consent of donors) to use $3300, out of $5807.50 contributed, for the personal service payrolls, leaving only $2507.50 for the enrichment of the collections. In the face of increasing needs the annual contributions to this fund have steadily diminished during the past eight years, as follows:

1927	*1928*	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*
$9,882	$7,420	$7,282	$6,539	$6,762	$6,157	$6,134	$5,807

There has been a falling off of 41% in the eight year period.

Tax Budget and Private Funds

The Tax Budget appropriation for maintenance for 1934 was as follows:

	Requested	*Granted*	*Change from 1933*
Personal Service.....	$69,266.00	$67,820.22	$1,445.78 *Decrease*
Other Codes.....	16,869.03	14,879.03*	$1,165.59 *Increase*
	$86,135.03	$82,699.25	$ 280.19 *Net Dec.*

* Including supplementary appropriation of $3,133.03 for deficit on Fuel Supplies for the second half of 1933 and for 1934.

The total budget for 1934 was $7672.72 less than for 1933.

The Private Funds Budget was $85,550.99, as against $92,943.52 in 1933, a decrease of $7392.53.

The Private Funds Budget was $2851.74 more than the Tax Budget.

For the past seven years the percentages of the two budgets have been as follows:

	1928	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*
Tax Budget	48%	43%	44%	48%	50%	47.2%	49.2%
Private Funds	52%	57%	56%	52%	50%	52.8%	50.8%

Endowment Increment

By the Endowment Increment plan $5075.05 was added to the Principal of this account during 1934. This was derived solely as interest on the principal. During 1934 no transfers were made to this principal from other accounts. By the Endowment Increment plan the permanent funds of the Garden have been increased by $130,064.31 since the plan was adopted 14 years ago (February 1, 1921).

Comparisons with the peak budgets during the six year period ending December 31, 1934, are as follows:

Tax Budgets		*Private Funds Budget*		*Total Budget*	
1931.	$101,400.00	1929.	$129,322.81	1930.	$228,867.27
1934.	82,699.25	1934.	85,550.99	1934.	168,250.24
	$ 18,700.75		$ 43,771.82		$ 60,617.03

No comment is necessary to emphasize what a serious matter it is to have a loss of more than $60,000 in income in four years from a budget of only $228,000.

Appended Reports

The Reports on Research for 1934, the departmental administrative reports, and Appendices 1–8 follow as integral parts of the Annual Report.

Respectfully submitted,

C. Stuart Gager,

Director.

REPORTS ON RESEARCH FOR 1934

Plant Pathology

By George M. Reed

Studies on the Inheritance of Resistance of Oat Hybrids to Loose and Covered Smuts

Experiments with the Second Generation of Oat Hybrids.—The second generation plants of four new hybrids were available for the study of inheritance of resistance to loose and covered smuts. One series of second generation plants of each hybrid was inoculated with the loose smut and another with the covered, and the percentage of infected plants determined.

Canadian and Black Norway, the parental varieties of Hybrid 83, are very susceptible to loose smut. Only 18 second generation plants were inoculated with it, 15 of which (83.3 per cent.) were infected. Apparently, the second generation plants are about as susceptible as the parental varieties. The variety Canadian is very susceptible to the covered smut, while Black Norway is resistant. There were 64 second generation plants inoculated with this smut and 8 (12.5 per cent.) were infected. Thus, the results indicate that resistance is dominant in inheritance.

Hybrid 84 is a cross between Scottish Chief, a variety moderately susceptible to the loose smut and resistant to the covered, and Black Mesdag, a variety resistant to both smuts. There were 388 second generation plants of this hybrid inoculated with the loose smut and 70 (18 per cent.) were infected. In this hybrid also, resistance to the loose smut is dominant in inheritance. There were 182 second generation plants of this hybrid inoculated with the covered smut and 9 (4.9 per cent.) were infected. It is interesting to note that although both parents are very resistant to the covered smut, yet a few infected second generation plants appeared.

Hybrid 85 is a cross between Black Mesdag, resistant to both smuts, and Danish Island, a variety very susceptible to the loose smut and moderately susceptible to the covered smut. There were 118 second generation plants inoculated with the loose smut and 34 (28.8 per cent.) were infected. Again, resistance to the

loose smut is dominant in inheritance. In the covered smut series, 131 plants were inoculated and 10 (7.6 per cent.) were infected. In this hybrid also a few infected second generation plants were observed; in view of the moderate susceptibility of Danish Island to the covered smut, this result might be expected.

Hybrid 86, Monarch Selection × Gothland, is a cross between two varieties very susceptible to the loose smut and highly resistant to the covered. There were 163 second generation plants inoculated with the loose smut and 152 (93.2 per cent.) were infected. Thus, the second generation plants were as susceptible as the parental varieties. There were 166 second generation plants inoculated with the covered smut, and none was infected. The complete resistance of the parental varieties to this smut appears in the second generation.

Experiments with the Third Generation of Oat Hybrids.—In the last Annual Report, the data for the second generation of Hybrid 79, Canadian × Monarch, Hybrid 80, Canadian × Monarch Selection, Hybrid 81, Gothland × Black Mesdag, and Hybrid 82, Danish Island × Monarch, are recorded. During the past year, many third generation progenies of each of these hybrids were grown. Usually, one series of plants of each progeny was inoculated with the loose smut, and a parallel series with the covered smut.

The parental varieties of Hybrid 79, Canadian and Monarch, are both very susceptible to the covered smut, and in the second generation the percentage of infection was 98.8. There were 52 third generation progenies inoculated with the covered smut, and all of these showed a very high percentage of infection. There was a total of 796 plants, of which 752 were smutted. Thus, the susceptibility of the two parents appears in both the second and third generations.

Canadian is very susceptible to the loose smut, while Monarch is resistant. In the second generation, 39.3 per cent. of the plants inoculated with the loose smut were infected. There were 336 third generation progenies grown, of which 228 descended from uninoculated second generation plants. These progenies were classified as 29 resistant, 87 susceptible, and 112 segregating, the latter progenies giving a comparatively low percentage of infection.

Hybrid 80, Canadian × Monarch Selection, is an interesting contrast to Hybrid 79, since both parents are susceptible to loose smut, while Monarch Selection is resistant to the covered. Practically all of the second generation plants inoculated with the loose smut were infected, and the 25 third generation progenies grown gave high percentages of infection; altogether, there were 402 plants and 399 were infected.

There were 97 second generation plants inoculated with the covered smut and 28 (28.8 per cent.) were infected. There were 142 third generation progenies grown, of which 84 descended from uninoculated second generation plants. These progenies were classified as 18 resistant, 40 segregating, and 26 susceptible. These data are in harmony with those obtained for the second generation.

Hybrid 81 is a cross between Gothland, a variety susceptible to loose smut and resistant to the covered, and Black Mesdag, a variety resistant to both smuts. In the second generation, 97 plants were inoculated with the loose smut and 26 (26.8 per cent.) were infected. There were 144 third generation progenies inoculated with the loose smut, of which 84 descended from uninoculated second generation plants. The third generation progenies were classified as 23 resistant, 38 segregating, and 23 susceptible. Again, the results are in close harmony with the data obtained for the second generation.

The second generation of this hybrid gave negative results with the covered smut. It is interesting to note that a few infected plants appeared in some of the third generation progenies. None of the progenies, however, gave a very high percentage of infection.

Hybrid 82 is a cross between Danish Island, fully susceptible to loose smut and moderately so to the covered, and Monarch, a variety resistant to the loose smut and susceptible to the covered. In the second generation, 19.4 per cent. of the plants inoculated with loose smut were infected. In the third generation, 195 progenies were grown, of which 135 descended from uninoculated second generation plants. These progenies were classified as 36 resistant, 15 susceptible, and 84 segregating.

The results with the covered smut on this hybrid are especially

interesting. In the second generation, 71.4 per cent. of the plants were infected, a total of 287 being inoculated. The behavior of this hybrid is very different from that of the other hybrids just mentioned. The results obtained may, however, be associated with the fact that Danish Island occasionally gives some infected plants with the covered smut, Monarch being fully susceptible.

There were 193 third generation progenies of this hybrid inoculated with the covered smut, of which 133 descended from uninoculated second generation plants. Only 1 of these progenies was classified as resistant; there were 52 segregating and 80 susceptible. Most of the susceptible progenies gave 100 per cent. infection.

Experiments with the Fourth and Fifth Generations of Oat IIybrids.—Additional data on the fourth and fifth generations of Hybrids 29 to 32, Fulghum × Black Mesdag, were obtained, the plants being inoculated with the Fulghum Race of loose smut. Fulghum is quite susceptible to this race, while Black Mesdag is resistant. The families selected had shown a high degree of resistance in the earlier generations, and it was demonstrated that this resistance persisted through the fourth and fifth generations. The lines selected for growing showed various combinations of the morphological characters of Fulghum and Black Mesdag.

The experiments with these hybrids have extended over a period of several years, and extensive data on the second, third, fourth, and fifth generations have been accumulated. The results have been assembled for early publication.

A few third, fourth, and fifth generation families were grown of Hybrid 50, Canadian × Markton, Hybrids 51 and 52, Early Champion × Markton, Hybrid 53, Victor × Markton, Hybrid 56, Gothland × Markton, Hybrid 60, Monarch × Markton, Hybrid 61, Seizure × Victor, Hybrid 62, Scottish Chief × Victor, Hybrid 63, Gothland × Monarch, Hybrid 64, Rossman × Monarch, Hybrid 65, Danish × Monarch, Hybrid 66, Danish Island × Monarch, Hybrid 67, Seizure × Monarch, and Hybrid 68, Monarch × Scottish Chief, and some points in the inheritance of smut resistance were clarified. The various crosses involve interesting types of combinations of resistance to the Missouri

races of loose and covered smuts. Studies with these hybrids have also been continued over a period of several years, and are now being prepared for early publication.

The very extensive results obtained with the hybrids between Black Mesdag and Hull-less, Silvermine, and Early Champion, were published during the past year. The accumulated data extended over the second, third, fourth, and fifth generations. One of the most interesting features of the results with these hybrids was the similarity in their behavior to both loose and covered smuts.

The results with another series of hybrids were published in co-operation with T. R. Stanton, Senior Agronomist, Division of Cereal Crops and Diseases, Bureau of Plant Industry, and F. A. Coffman, Associate Agronomist, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Washington, D. C. These hybrids involved various combinations in the resistance of the parental varieties.

Physiologic Races of Oat Smuts

During the past year, particular attention was paid to collections of smuts on varieties belonging to the red group of oats. Five different collections of covered smut on Fulghum, nine collections of loose smut on Fulghum, and four collections of loose smut on Red Rustproof, were grown on an extensive series of oat varieties in order to determine the degree of specialization of these smuts. It is definitely established that the Fulghum race of loose smut is very distinct from the Red Rustproof race, and that both races can be readily separated from many other highly specialized races of loose smut.

The covered smut on Fulghum is particularly interesting because of its ability to attack Black Mesdag, a variety of oats which is very resistant to collections of both loose and covered smuts.

The data obtained have been combined with other data secured in past years and, in cooperation with T. R. Stanton, Senior Agronomist, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Washington, D. C., the results are now being prepared for publication.

The importance of physiologic specialization in the oat smuts is brought out by some of our studies on the inheritance of smut resistance. In most of our studies, the Missouri races of loose and covered smuts have been used, the specific reaction of the parental varieties to these having been determined. In a series of hybrids between Fulghum and Black Mesdag, however, an entirely different race of smut has been used. The reaction of one specialized race on a group of hybrids may be totally different from the reaction of another specialized race.

Cultural Characteristics of the Oat Smuts

Mr. L. Gordon Utter has continued his studies on the characteristics of both loose and covered smuts of oats when grown on artificial media in flasks. Cultures of several of the specialized races of each of the smut species have been grown, and observations made both on the variations and similarities shown by successive transfers. These observations have covered sets of flasks within a single race, as well as sets between several races and even the smut species.

The cultures have been derived from the resting spores (chlamydospores) which constitute the black, dust-like mass replacing the oat floral parts, and also from the conidia which are produced by the germination of the chlamydospores. Observations on four races of the loose smut and six races of the covered smut have been made on cultures from chlamydospores, cultures from single conidia, and cultures from combinations of single conidia. The cultures have been continued by successive transfers over a period of a few months to four years.

The results with the chlamydospore cultures indicate that certain sets of cultures of individual races may show uniformity, while others show considerable variation. The range of variation within an individual race may be as great, or greater, than that between different races. Some of the cultures of particular races have shown very similar characteristics.

One race each from the loose and covered smut, represented by numerous conidial cultures, both singly and in combination, showed many sets to be of similar characteristics. However, there were cases of decided dissimilarity within sets of single

conidial cultures as well as between the various sets. Combinations of single conidial cultures from the two smut species indicated an analogous situation.

Data have been accumulated on 235 chlamydospore and conidial cultures from 11 races of loose smut, and 244 similar cultures of 6 races of the covered smut, which have been grown over a period of from two months to four years. Careful notes have been taken on the color and topographical characteristics of these various cultures. Several races of the loose smut showed that successive transferring from the original culture, carried through one to five culture generations, generally resulted in continuous variations. Certain exceptions, however, were noted. Although these variations were definite, it was observed that the color and topographic characteristics of all the culture sets were confined within a given range.

Culture lines developed from individual spores of a single race tended to exhibit variations both in color and topographic characteristics. When comparisons were made between other individual lines of the same race, or between those of various races, it was found that considerable overlapping of the salient characteristics occurred.

Similar examinations of the cultures of covered smut were made, with results paralleling those previously noted. In general, somewhat less variation was observed in the cultures of covered smut as compared with those of the loose smut.

Sorghum Smuts

Miss D. Elizabeth Marcy has continued her studies on the inheritance of resistance of various sorghum hybrids to the covered smut of sorghum. In previous years, infection of susceptible varieties has been somewhat uncertain, and during the past year some experiments were carried out in order to find, if possible, more effective environal conditions for infection. As a result of modifying the moisture relations of the sand in which the seed was planted, a much higher percentage of infection of susceptible varieties was secured. Six varieties which have been classified as susceptible gave between 79.2 and 100 per cent. infection, much higher than had been obtained in other years.

It was further found that Feterita plants showed a definite effect of inoculation. Uninoculated plants produced normal heads but, if the plants were inoculated, approximately 50 per cent. of them failed to produce normal heads, the flower buds being blasted, and very little, if any, grain produced. Sometimes smut balls were found on the blasted heads, showing that the smut mycelium had developed in the plant, reaching the stage of spore formation. Occasionally, a typically smutted head was observed, as in other years. A few blasted heads of Feterita had been observed in previous years, and this peculiar effect upon this variety is especially important in interpreting the results with the hybrids. The inoculated Milo plants, as in previous seasons, showed no evidence of infection. While Feterita, under usual conditions, may be classified as a resistant variety, it is evidently genetically quite different in its response to that of the Milos.

During the past year, a considerable number of first generation plants were inoculated with the covered smut. The first generation plants of crosses between Feterita and susceptible varieties were infected. The first generation plants of crosses between two susceptible varieties, such as Dawn Kafir and Red Amber Sorgo, also were infected. The first generation plants of crosses between Milo and susceptible varieties remained normal.

A large number of second generation plants of crosses of three different types, based on the behavior of the parental varieties, were grown. In the cross between Feterita and Dwarf Yellow Milo, occasional smutted and blasted plants were observed in contrast to previous years, when none was recorded.

In the second generation of hybrids between susceptible varieties and Feterita, a large percentage of the second generation plants were either blasted or infected, 50 to 77.5 per cent. having typical smutted heads. The results clearly indicate that susceptibility is dominant. On the other hand, when these varieties are crossed with the Milos, no blasted heads appear in the second generation, and there is a low percentage of infection, ranging from 13.7 to 25 per cent. It is evident that the Milo factor of resistance is very different from that of Feterita. A hybrid between two susceptible varieties, Dawn Kafir and Red Amber Sorgo, gave 100 per cent. infection in the second generation.

A series of 264 third generation progenies belonging to nine different hybrids was inoculated with the covered smut. These involved various combinations of smut resistance in the original parental varieties. In the hybrids in which Feterita was one of the parents, many blasted plants appeared. These were in striking contrast to the hybrids in which the Milos were the resistant parents.

There were 441 fourth generation families of several hybrids grown. These were tested to determine the relation of resistance and susceptibility in the third generation by observing the behavior of the fourth generation. Altogether, 75 fifth generation families of the hybrid between Feterita and Sumac Sorgo were grown, and additional light on the inheritance of susceptibility in this hybrid was obtained.

The loose smut of sorghum was also used in a large number of experiments. First generation plants, as well as second, and 273 fourth generation progenies were inoculated, and extensive data on their reaction to the loose smut have been obtained.

It was possible to carry out these extensive experiments with the sorghum smuts through the courtesy of Director H. B. Knapp and his associates, State Institute of Applied Agriculture on Long Island, Farmingdale, L. I. Approximately one acre of land was placed at our disposal, making it possible to grow about 26,000 plants. The large amount of data accumulated on all these sorghum hybrids is being prepared for early publication.

Graduate Students and Independent Investigators Enrolled During 1934

During the past year, Mrs. Marie E. Conklin continued her investigations on the bacteria which form tubercles on the wild legumes. Her studies involve the problem of the cultural characteristics of the bacteria isolated from different plants, and also their capacity for infecting. She has accumulated a large amount of data, and is now preparing her results for publication.

Dr. Elva Lawton, a member of the Biology Department of Hunter College, has continued her studies on regeneration and polyploidy in ferns.

Dr. Frances A. Hallock continued her studies of the morphology and relationship of the evergreen shrub *Garrya*.

FOREST PATHOLOGY

By Arthur Harmount Graves

Chestnut Breeding Work in 1934

For the benefit of those who are not acquainted with this work, it should be stated that the project consists of the interbreeding of various species and types of chestnut, with the object of replacing, if possible, with new stock, our valuable native chestnut trees. As is generally known, these have now practically disappeared from the forests of North America as the result of a deadly disease caused by the fungus, *Endothia parasitica*. The progress of the work in previous years has been recounted in former volumes of the *Brooklyn Botanic Garden Record* (**19**: 62–67; **20**: 83–87, **21**: 46–53; **22**: 57–63; **23**: 67–75). It was stated in last year's report that "For the present our method is to cross-pollinate the blight-resistant Japanese chestnut, a [comparatively] low-growing, orchard type of tree, with the susceptible American timber tree, in the hope of getting, among the offspring of these two parents, the desired combination [of characters], that is, a blight-resistant tree of the tall timber type."

This plan has been considerably extended during the past year: we are now making crosses between as many species and hybrids as we can; and we are finding, incidentally, that the different forms are readily amenable to hybridization. It is scarcely necessary to add that in this way we shall obviously increase the chances of ultimate success. Since the Garden plantations are too limited in area to include any considerable planting of chestnut trees, the trial grounds for this work, covering several acres, are located on land belonging to the writer, a 40-acre plot on the southern slopes of Mt. Carmel (known locally as the "Sleeping Giant") in the township of Hamden, near New Haven, Connecticut.

Blooming of Hybrids. By far the most important development of the past year was the blooming of three of our Japanese-American hybrids, which were only in their *third* year of growth. American chestnut seedlings (*Castanea dentata*) bloom ordinarily between the ages of 10 and 15 years, Japanese (*C. crenata*) sometimes as early as 5 years of age. "Blooming," or the ap-

pearance of flowers, means that sexual organs have been formed and germ cells (presumably) have been developed for reproductive purposes. In other words, it means the potential beginning of a new generation of individuals. For, if the egg in the pistil is fertilized by a sperm from the pollen grain, an embryo plant begins to grow, which when fully developed, forms the essential part of the seed. Here, the seed is also surrounded by the ovary wall—the whole forming the "chestnut." *

This early blooming is a phenomenon that is to be expected in hybrids, and is an expression of what geneticists call "hybrid vigor" or *heterosis*. Hybrid vigor has been known and studied from the time of Koelreuter (1765), who makes the following interesting and (for the times) rather surprising remark: "I would wish that I or another were so fortunate as to obtain a hybrid of trees, which, in respect to the utilization of their wood, might have a great economic influence. Perhaps such trees among other good characteristics might also have these, that, if the natural ones required for their full growth, for example, a hundred years, they would reach it in half this time. At least I do not see why they should behave differently in this respect from other hybrid plants." †

What a vast difference such precocious flowering makes in our problem will be clear when one reflects that it means three years between generations instead of ten or more. We do not expect the future generations to continue as short as this; but, on the other hand, we are no longer counting on ten years as the minimum time for a single generation. A second cross of one of these hybrids, made this year, has yielded two nuts, one of the parents being again the American chestnut, from pollen received from the U. S. government nursery near Washington, D. C. Since these hybrids are still small (about 2 feet high at the beginning of

* The two large parts (almost halves) of the chestnut, just as in the bean or the peanut, are the first leaves of the embryo; the rudimentary stem and root are tiny organs located at the base of these fleshy leaves, where all the parts come in contact.

† Quoted from Roberts, H. F. Plant hybridization before Mendel. Princeton, 1929, p. 55. See also Koelreuter, J. G. Vorläufige Nachricht von einigen das Geschlecht der Pflanzen betreffenden Versuchen und Beobachtungen. Dritte Fortsetzung. 1765.

the season) it is hoped that height growth may be increased by this second dose of the American parent.

New IIybrids in 1934.—Another important development of our work in 1934 has been the production of new hybrids. Incidentally, it should be stated that all of the hybridization work this year was carried on at the trial grounds at Hamden, because many of the trees there have now reached the age of bearing flowers and nuts. The pollen used for crossing was in all cases carefully bagged before the anthers dehisced, for there is of course danger of contamination from various causes—chiefly insects and wind. The American pollen (of *Castanea dentata*), which was supplied as usual through the cordial cooperation of the Division of Forest Pathology, U. S. D. A., had also been bagged at an early stage. The hybrids produced in 1934 (at least as far as the embryo stage in the nuts) are as follows:

(1)	2	Smith hybrids (Jap. × Amer. *i.e. crenata* × *dentata*, 3 yrs.*) crossed with American chestnut (U. S. D. A.)
(2)	12	Chinese chestnut (*C. mollissima*, 8 yrs.) crossed with *Castanea dentata* (U. S. D. A.)
(3)	19	Chinese chestnut (*C. mollissima*, var. Mammoth, 6 yrs.) crossed with American Chestnut (U. S. D. A.)
(4)	7	Chinese chestnut (*C. mollissima*, 8 yrs.) crossed with *Castanea Seguinii* (8 yrs.)
(5)	4	Chinese-chinquapin hybrids (*mollissima* × *pumila*) 6 yrs., crossed with American chestnut (U. S. D. A.)
(6)	4	Japanese forest type (*C. crenata* var., 6 yrs.) crossed with American chestnut (U. S. D. A.)
(7)	8	"S8" (8 yrs.) crossed with Japanese forest type chestnut. (*C. crenata* var., 6 yrs.)
(8)	1	"S8" (8 yrs.) crossed with American chestnut. (*C. dentata*) (U. S. D. A.)
(Total)	57	

As far as can be ascertained from definite, published records, these combinations are all new to science.

With the exception of the first case, which has already been explained, a few remarks about some of these crosses may be of

* The ages of the parents as of 1934 are given, where possible, in parentheses.

interest. The numbers in parentheses refer to the different crossings, as numbered above.

(2) The Chinese chestnut, as far as blight resistance is concerned, is our finest stock. For the whole six years we have had these trees they have never shown a sign of blight. Of the row of fifteen trees the average height is now about 8 feet. Several are 9 feet high, and two are eleven. In spite of repeated pruning of the lower branches, they persist in developing into a low-headed form, *i.e.* the side branches grow out with greater vigor than the main shoot. Therefore, in view of our aims, a crossing with the more upright-growing American chestnut seems desirable.

(4) In our form of the Chinese chestnut only one, if any, bur appears at the base of a flowering branch. The dwarf species, *C. Seguinii*, from Eastern and Central China, on the other hand, is most prolific; and, in addition, blooms from June to October. It will be seen that crosses of these two species may produce valuable breeding stock.

(7) "S8," a cross made by Dr. Van Fleet, is said to be a hybrid of the chinquapin, *C. pumila*, and the Chinese chestnut, *C. mollissima*. It is extremely prolific, but, unfortunately, somewhat susceptible to the blight. Therefore we gave it a dose of the resistant Japanese this year, and hope for more disease-resistant offspring. "S8," pollinated with *mollissima*, gave negative results.

Data on Hybrids now Growing at Hamden.—In all, there are now growing at Hamden 97 Japanese-American hybrid chestnuts. This figure does not include, of course, the 57 hybrid nuts formed as a result of crosses this year. The heights and numbers of the hybrids at Hamden are as follows:

TABLE OF GROWTH RATES OF JAPANESE-AMERICAN HYBRID CHESTNUTS AT HAMDEN, CONNECTICUT, 1934

Name	Number of Trees Living October	Average Height October	Average Length Growth, 1934
Folk 1931	1	4 ft.	10 in.
Hammond 1931	4	4 ft. 10 in.	1 ft. 2 in.
Hammond 1933	7	1 ft. 3 in.	1 ft. 3 in.
Minturn 1933	8	1 ft. 5 in.	1 ft. 5 in.
Smith 1931	47	3 ft. 5 in.	1 ft. 1 in.
Smith 1932	27	1 ft. 4 in.	8 in.
Winthrop 1931	3	2 ft. 9 in.	11 in.

The prize tree, a Hammond Japanese-American hybrid of 1931, is now 7 feet high, at the end of its third year. The growth rate has obviously decreased from those of the previous two years. It was also cut back a little in the spring, on account of possible winter injury to the tips of the branches. We have now three Smith hybrids (3 yrs. old) which are over 5 feet in height. Here again we have an illustration of what is meant by "hybrid vigor."

Winter Injury.—The effect of the extreme cold of the winter of 1933–34 on the various species and hybrids of chestnut was most interesting. The mercury fell as low as 24° below zero, the neighbors reported. In the two plantations, one in fine garden soil lower down the mountain and the other in poorer soil farther up, the differences in the extent of the damage were very marked. The upper plantation fared much the worse, some of the Folk (pure) Japanese being badly killed, even to the ground. One especially, which had grown to a height of 8 feet, was killed to the ground. Here also, many of the Europeans from Paris, Geneva, and Berlin (one year old), as well as the "Italian" seedlings set out in the spring of 1932, were killed to the ground, and some were killed outright. The European seedlings in the nursery at the Brooklyn Botanic Garden were also badly injured. Many of the Europeans, however, sprouted up from the base this year. The following is a general summary of the character and amount of winter injury in the different types.

1. *Castanea dentata*, American chestnut; not injured in the slightest degree.

2. *C. crenata*, Japanese chestnut; usually killed back along the tips of the branches and in some cases badly killed back to the main trunk. In a few cases five year old trees were killed to the ground. Also, the buds were injured, as shown by peculiar one-sided, cup-shaped, deformed leaf development from these buds later in the year. Sometimes the wood was blackened, as seen by cutting through the twig.

3. *C. sativa*, European or "Spanish" chestnut; badly affected: some killed to the ground, some entirely dead.

4. *C. mollissima*, Chinese chestnut; came through the winter entirely uninjured.

5. *C. Henryi* was badly winter killed.

6. *C. Seguinii* was also winter killed (as usual.)

7. The Japanese-American hybrids came through very well on the whole. The tips of the twigs were killed back in some cases, especially where there had been a third season's growth in 1933 and the wood was not mature. Most of this third season's growth was pruned off in the spring of 1934.

It is very interesting to see how the hardiness can in most cases be referred back to the native environment of these species. Thus the Chinese *C. mollissima* and the American *C. dentata* were perfectly hardy, while the European (''Spanish'') *C. sativa* and the Japanese *C. crenata* were susceptible, the former extremely so.

Blight and Other Diseases.—Two of our Smith hybrids of 1931 had side branches affected with blight; one of the Japanese forest type (78634) was badly blighted following winter injury; one of the Americans from seed received from Mr. Thomson in 1931 was slightly blighted; and one American from Portland, Maine, nine years old, was blighted entirely to the ground. Two of the Japanese forest type showed fungi in old pruning scars; in one case, *Polystictus versicolor;* in the other. *P. pergamenus.* In both cases the fungus appeared pathogenic, but the trouble may have been linked up with a weakening of the stem tissues through winter injury.

Insects.—The aphis (*Calaphis castaneae*) which was found on the leaves late in the summer of 1933, put in an early appearance this year (about July 10), curling the leaves and in a few cases causing them to become chlorotic. The trees were sprayed thoroughly with soap and nicotine sulphate five times in the summer, viz. July 15, 16, 28, August 19, September 1, with the result that the pest was kept under control.

New Plantings and Distributions.—Besides the 17 hybrid seedlings of 1933, 29 2-yr. old Spanish (*C. sativa*) chestnuts were planted in sod land (15 feet apart) at Hamden. These Europeans are from seed I arranged to have sent here when I visited European botanic gardens in 1932. There are still 21 Europeans from Berlin in the nursery at the Garden. In addition, 13 Americans, from seed given us by Miss Hilda Loines, Dr. H. K. Svenson, and Dr. M. F. Schlesinger, were planted in the same lot. About 80 "natural" nuts, *i.e.* those which had developed without artificial pollination in our own plantations, were planted in newly cleared forest land in "spots" 6 feet apart. Trees of *C. sativa* from the Garden nursery were given to the following:

Mr. John Herlihy for planting at Prospect Park, Brooklyn ..... 11 trees
Miss Maud H. Purdy for planting at Pomona, N. Y..... 6 "
Mr. Frank Stoll for planting at Layton, N. J..... 6 "

Chinquapins.—*Castanea pumila*, the chinquapin, is an important shrubby species with small nuts, native in the southern states and not yet growing in our plantations. This species is reported to be blight-resistant to some extent. We were fortunate, during the fall, again through the cooperation of the Division of Forest Pathology, U. S. D. A., in securing a fine lot of nuts of this species from Mr. D. A. Bisset, of the U. S. D. A. Plant Introduction Station at Savannah, Ga.

Propagation.—Experiments are now under way at the Garden and at Hamden in grafting and layering, by which we hope to propagate the desirable forms asexually.

Total Number of Trees Growing.—We have now growing on our plantations a total of 398 trees of the various species and hybrids. This includes 21 Europeans, 2 yrs. old, still growing in the Garden nursery.

Systematic Botany

By Alfred Gundersen

The Classification of Dicotyledons

The study of flower structures and flower buds, with special reference to placentation, has been continued. Miss Maud Purdy has now drawn altogether more than two hundred species. Some of these are incomplete in one way or another but in the great majority of cases have much more detail than is available in published illustrations. The drawings represent nearly two hundred genera, about a hundred families. The work on any one flower often cannot be completed at one time, because flowers are at a certain stage and an earlier stage is wanted. The time of the year that it should be looked for is then estimated. For example, the early stages of the buds of early spring flowers must usually be taken the preceding summer or early fall.

The Brooklyn Botanic Garden is laid out by the Engler system, which was proposed nearly half a century ago as a modification of the Eichler system which is, in turn, a modification of the Bentham and Hooker system. At first the information on

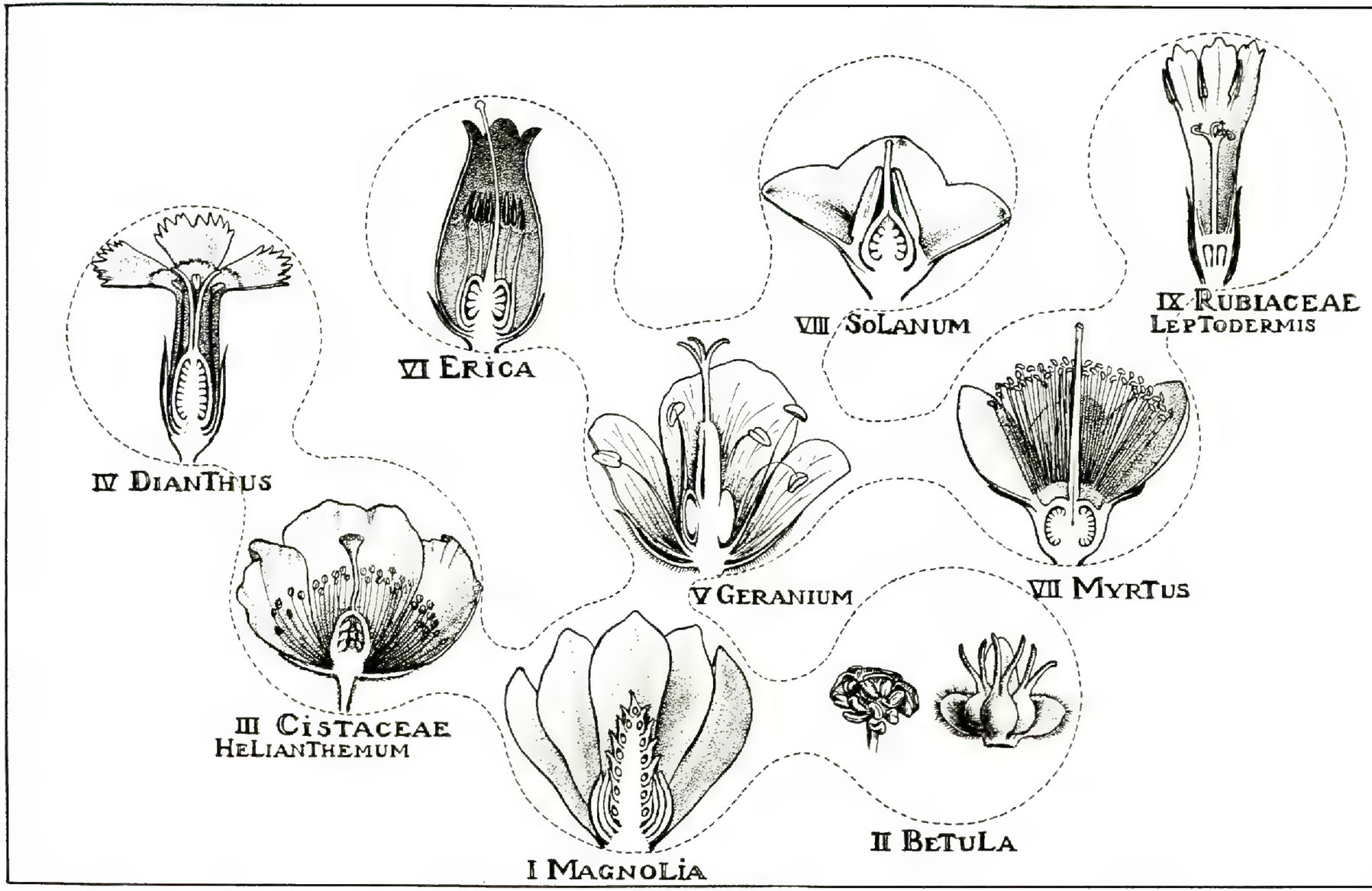

FIG. 10. Classification of Dicotyledons based upon flower structure. The relative size of the ovaries is exaggerated for clearness.

flower structures and the drawings themselves were classified by the system of our Garden. Gradually, however, the desirability of certain changes became more and more convincing.

Of more recent systems, that of Bessey and that of Hutchinson may be considered as somewhat extensive modifications of the Bentham and Hooker system. The Warming and Wettstein systems are less extensive modifications of the Engler system.

Perhaps the truth may be near the middle of conflicting views. It may be possible to modify the Engler system slightly more than is done in the Warming and the Wettstein systems, but without departing from it so far as is done in the Bessey and the Hutchinson systems. This is attempted in the following outline of Dicotyledons, illustrated on p. 66:

A. Carpels separate or single

I. Magnoliflorae—Magnolia, Rose and perhaps Protea Groups of families. (Stamens usually numerous, petals separate or absent, flowers often large, mostly trees and shrubs)

B. Carpels united

a. *Flowers inconspicuous, mostly wind pollinated*

II. Betulaeflorae—Betula and Ulmus Groups. (Mostly trees and shrubs)

b. *Flowers with conspicuous double perianth, insect pollinated*

α Placentation usually parietal

III. Cistiflorae—Cistus, Papaver, Cactus and Gourd Groups. (Sepals separate, stamens often numerous, embryo often curved) Cf. Bentham and Hooker

β Placentation central or basal

IV. Dianthiflorae—Dianthus, Piper and Primula Groups. (Embryo usually curved, mostly herbaceous plants). The connections Cactaceae-Aizoaceae and Frankeniaceae-Caryophyllaceae make this position necessary.

γ Placentation usually axile

1. *Ovary usually superior*

V. Geraniflorae Geranium, Maple and Rhamnus Groups. (Carpels often but slightly united, floral parts often in five's, usually two staminate whorls, petals separate)

VI. Ericaeflorae—Erica Group. (Floral parts as in Geranium Group, but sympetalous)

VII. Solaniflorae—Solanum Group. (Carpels usually 2, stamens in single whorl, epipetalous, corolla sympetalous)

2. *Ovary usually inferior*

VIII. Myrtiflorae—Myrtus, Hydrangea and Cornus Groups. (Polypetalous)

IX. Rubiflorae—Rubia and Composite Groups. (Sympetalous)

The Genus Staphylea

Mr. Charles F. Doney, Curatorial Assistant, concluded his studies of the genus *Staphylea*, submitted as a Master of Science thesis to New York University, in harmony with the agreement of April 1st, 1916 between the University and the Botanic Garden.

Check List of Trees and Shrubs

With the cooperation of Mr. Alfred Rehder, of the Arnold Arboretum, and Mr. Henry Teuscher, of the New York Botanical Garden, this list is now nearing completion. The list bears somewhat the same relation to Rehder's Manual that Dalla Torre and Harms's *Index* bears to the *Pflanzenfamilien*.

Systematic Botany

By Henry K. Svenson

Flora of Galapagos and Cocos Islands

During the past year, some time was spent in re-arrangement of the manuscript of the plants of the Astor Expedition to the Galapagos and Cocos Islands (1930). This manuscript, which is a catalogue of the plants, exclusive of the ferns, will be published in the February, 1935, issue of the *American Journal of Botany*. Publication of this account has been made possible by the generosity of Mr. Vincent Astor. The paper consists primarily of notes on the habitat and altitudinal distribution of the species collected, with scientific description and discussions of new or noteworthy plants obtained on this expedition. There are nine plates illustrating the types of vegetation, both by line drawing and photography. Brief accounts of the general aspects of the vegetation on the separate islands which were visited are also included. A reproduction of one of the plates, drawn by Miss Maud H. Purdy, Brooklyn Botanic Garden artist, is included in this report. It illustrates the variation found within a single species, *Croton Scouleri*, a shrub or small tree found only on the Galapagos Islands, and evidently the "commonest bush" seen by Darwin (*Voyage of the Beagle*, ed. 2, p. 399. London, 1913). One of the most interesting problems of the Galapagos Islands is whether variations are confined to individual islands, thus showing the origin of definite varieties by geographic isolation, or

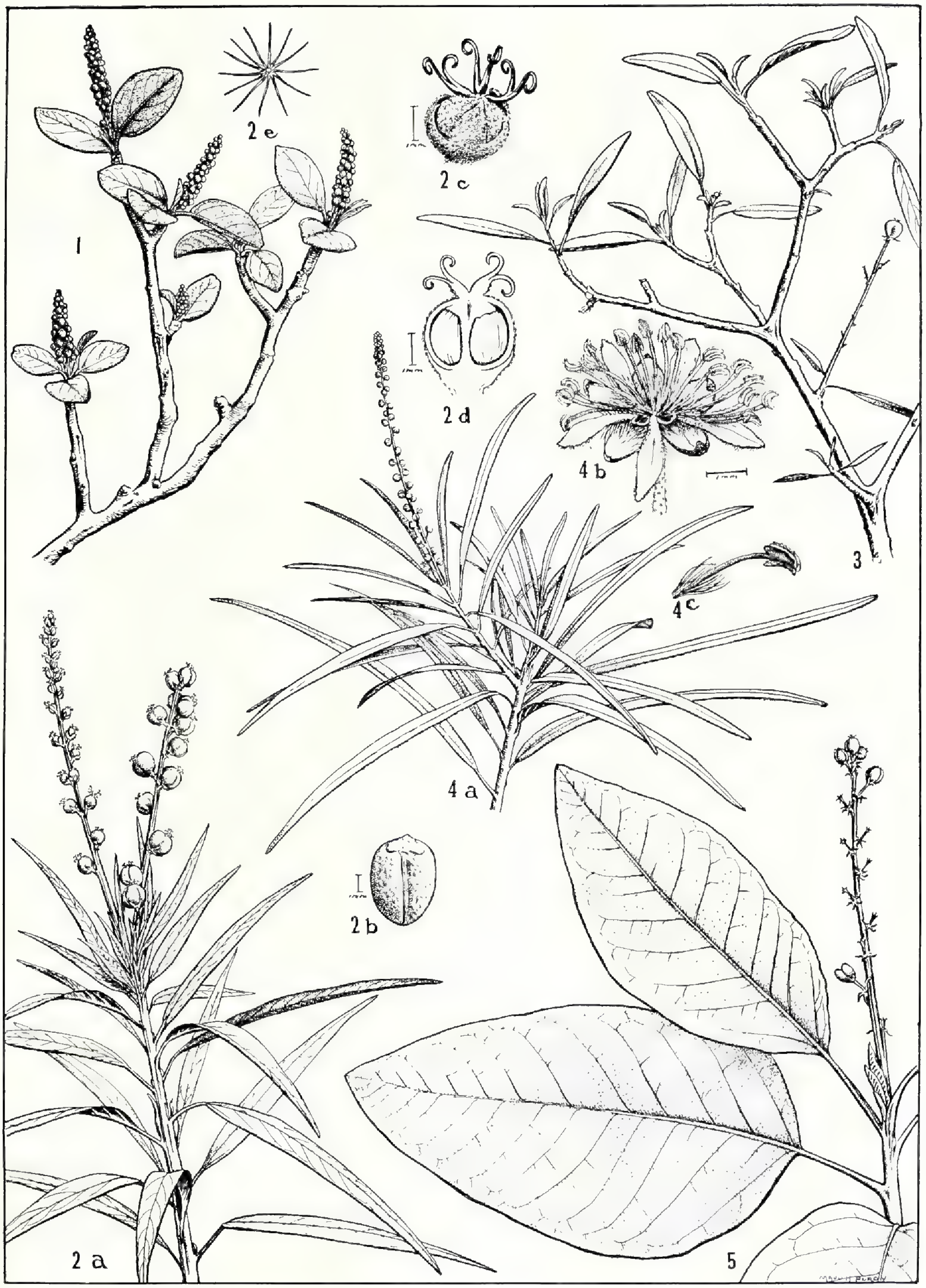

FIG. 11. Variation in *Croton Scouleri* from three islands of the Galapagos. 1. var. *brevifolius* (Tower Is.). 2. var. *genuinus;* b. seed, c. pistillate flower (Indefatigable Is.). 3. var. *albescens* (Charles Is.). 4. var. *Macraei;* b. staminate flower, c. stamen (Indefatigable Is.). 5. var. *grandifolius* (Indefatigable Is.). From *Amer. Jour. Bot.* **22**[2]. Feb. 1935.

whether they are chiefly the response to sharply varying conditions of moisture on the same or adjacent islands. In the case of *Croton Scouleri*, the leaf shape varies strikingly from the var. *Macraei*, found on the desert coast of Indefatigable Island, to var. *grandifolius* of the moist interior. Transections showing the altitudinal range of species of the moist windward slopes and dry leeward slopes of all the larger islands (similar to the altitudinal tables for plants of the Academy Bay Region) would show a conformity from island to island, and would probably go a long way toward an understanding of their complex flora. Due to the rough nature of the ground and the difficulties in transporting food and water, such studies would undoubtedly require a long time.

On the other hand, the vegetation of Cocos Island appears comparatively simple. Like most oceanic islands which have a wet tropical climate, the vegetation consists for the most part of ferns (often tree-like), orchids, and *Melastomaceae*. The species, as a whole, appear to be closely tied up with those of the adjacent Central American mainland.

Studies of Bidens

The problem of the species and varieties of *Bidens* centering on the Hudson River in New York has interested me for a number of years; I have made large collections of this genus on the tidal shores of both the Hudson and Hackensack rivers. Also I have continued the growing of unusual types in the greenhouse, which is not difficult, since the species are annuals and mature rapidly. *B. hyperborea*, a northern species extending from James Bay to the Merrimac River in eastern Massachusetts, was found last year in the Hudson River.

I have continued work on a flora of the Windham Valley in the northern part of the Catskill Mountains, an area which has been comparatively neglected by local botanists, and have made substantial progress in the collection of material.

From time to time, progress has been made in the complex genus *Eleocharis*. The plates and much of the manuscript for the group *Tenuissimae*, principally of tropical America and tropical Africa, are now ready. During the past year the *Eleocharis pauciflora* group was revised. *E. pauciflora* is represented from

the Himalayas, boreal Eurasia and North America, and from the Andes in South America. As might be expected, various forms are assumed by the species in these diverse geographical areas. The variety from northeastern United States and Canada has been set apart as *E. pauciflora* var. *Fernaldii* (Rhodora **36**: 380. 1934). A new species of *Eleocharis* from Brazil was described as *E. squamigera*.

Genetics

By Ralph C. Benedict

A Study of Variation of Nephrolepis

My study of variation in the fern genus, Nephrolepis, began at the Brooklyn Botanic Garden twenty years ago, in January, 1915. Since that time, special attention has been given to two types of variation: (1) bud variation of *Nephrolepis exaltata bostoniensis;* (2) variation in the spore progeny of *N. exaltata fertilis.* Incidentally, considerable attention has been paid to the study of variation among the natural species of this genus.

Beginning early in 1934, this phase of the problem has been taken up more intensively. The help of a considerable number of botanists the world over has been requested in the collection of species of Nephrolepis native in their regions. A special phase of this study has been the initiation of spore cultures of a number of different species. By this method, it is hoped that the collection of plants of various species may be increased, and that a comparative study of the gametophytic stage of the different species may be accomplished.

Economic Botany

By Ralph H. Cheney

Studies of Coffea arabica

A study of the molds which develop on commercial coffee essences and prepared, concentrated liquids was begun. The investigation concerning the formation and histology of the coffee leaf glands has progressed.

The summer of 1934 was devoted to research at the Marine Biological Laboratory at Woods Hole, Massachusetts. The

effect of caffeine, extracted from the seeds of *Coffea arabica* Linn., upon the auricular and ventricular muscle of the heart was determined. An experimental study of the possibility of a physiological antagonism between the plant alkaloids, caffeine and nicotine, as indicated by their combined effect upon the animal organism, was undertaken.

REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1934

DR. C. STUART GAGER, DIRECTOR:

Sir: I submit herewith my report for the year ending December 31, 1934.

GARDEN ATTENDANCE

Grounds.—As recorded by the turnstiles at the five entrance gates, total attendance at the Garden during 1934 was 1,352,407, as against 1,315,847 for 1933. This is an increase of 36,560, or nearly three per cent. A comparison of the table of attendance (p. 73) with that of other years brings to light several interesting points. For example, the small attendance for the month of February (46,663), doubtless due to the fact that this was an extremely cold month, was the smallest for this month since 1927 (43,579). But the figures for the months of August, September, October, and November are the largest for each of those months in the history of the Garden. The total for these four months was 452,696, or nearly one-half million people, as against 358,924 for 1933. The combined attendance at classes and lectures was 139,370, as against 126,934 for 1933, and 128,982 for 1932.

Conservatories.—In the total number of visitors to the conservatories during the year, 134,252, the all-time high record of last year (139,544) is nearly equalled. One figure deserves especial notice—the attendance during the month of April—30,262—which means an average of over 1,000 visitors a day. This considerably exceeds the record greenhouse attendance made in April, 1933—29,062. Evidently Chaucer's statement, "Than (*i.e.* in April) longen folk to goon on pilgrimages" is as true today as it was at approximately 1400 A.D., and an objective of many a Brooklyn pilgrimage in April is the Conservatory of the Brooklyn Botanic Garden.

ATTENDANCE AT THE GARDEN DURING 1934

	Jan.	Feb.	Mar.	Apr.	May	June	July
At regular classes	1,234	1,424	1,706	2,666	3,056	2,637	18,000
At visiting classes.....	144	492	1,590	4,469	20,646	8,752	342
At lectures to children....	1,000	331	1,284	2,613	15,916	6,583	165
At lectures to adults.....	150	100	600	447	685	368	62
At conservatories	6,747	4,929	9,833	30,262	19,356	10,363	8,259
At grounds	55,452	46,663	79,107	198,426	221,780	140,078	112,855

	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Totals
At regular classes.....	15,000	1,109	2,475	2,694	2,199	54,200
At visiting classes.....	12	105	3,549	5,080	2,154	47,335
At lectures to children.	0	270	2,072	3,000	1,599	34,833
At lectures to adults ..	0	50	360	140	40	3,002
At conservatories.....	9,392	8,573	9,367	10,220	6,951	134,252
At grounds.....	116,010	123,916	126,176	86,594	45,350	1,352,407

School Service

We have continued to supply study material to the high schools, junior high schools, and colleges, for a small charge—a measure which, it may be recalled, we were forced to adopt last year on account of the overwhelming demand for material of this sort. This service has been in charge of Miss Julia E. Best, who came to us last year to take over this part of our work. The following figures indicate to what extent this charge for material has affected the demand.

Statistics of Petri Dish Service, 1931–1934

	1931	1932	1933	1934
No. of requests for all material for the year	387	398	421	247
No. of petri dishes filled during year.....	5482	5727	4888	1154
C.c. of agar distributed in flasks during the year	11800	8400	12800	12600

In 1934 there was a noticeable reduction in the number of requests for all study material. As regards the most expensive item, *i.e.*, the Petri dishes, there was a conspicuous falling off at once in the fall of 1933, when the charging system was inaugurated, less than ⅓ as many being ordered as in the fall of 1932; in the spring of 1934 there was a greater reduction, less than ¼ as many being ordered as in the previous spring; and in the fall of 1934 a still further reduction from 1933.

Adult Classes and Courses

New Courses.—Two new courses which began in September were given by Miss Rusk. The course entitled "Flowering Plants: Field and Laboratory Study" (B10) has for its principal object an acquaintance with the species of wild flowering plants (including weeds) in this vicinity. The field work is done largely in the grounds of the Botanic Garden. The laboratory work consists of examining flowering plants and identifying them by means of a key. The course in "Genetics" (B17) comprises a discussion of Mendelian principles and the physical basis of heredity, with demonstrations. Both of these courses, which are now offered as a result of repeated requests on the part of the students for more advanced work, are accredited as "Teachers Courses" by the Brooklyn Teachers Association and each carries 2 credits. Miss Rusk gave a laboratory and field course of six sessions to members of high school clubs, in cooperation with the American Institute. A new course entitled "Practical Gardening" was given Saturday afternoons from February 2 to March 9 by Mr. Free.

Other Courses.—202 persons registered for the course in "Flower Arrangement" given in January and February—a nearly 100 per cent. increase over the number in 1933 (108). The lecturers were Mrs. William H. Cary; Mrs. Rioichiro Arai, assisted by Mrs. E. F. Eidlitz and members of the Japanese Women's Club of New York; Mrs. E. F. Austin; Mrs. Walter R. Hine; and Mrs. S. A. Brown. This course is sponsored by the Woman's Auxiliary. The course on "Trees and Shrubs of Greater New York" was conducted by Miss Vilkomerson and myself as usual. Fifteen persons registered in the spring and 36 in the fall. In the course

for nurses-in-training, classes came in both spring and fall from Kings County, St. Johns, and Prospect Heights Hospitals. The registration was 38 in the spring and 65 in the fall. At the last exercise of the course, for both terms, Mr. Jonathan Gordon, Ph.G., as in 1933, gave the lecture on drugs, their identification, preparation, and standardization.

Cooperation with Long Island University.—This year, for the first time, those courses in botany offered by the Brooklyn Botanic Garden which are open for credit to students of Long Island University, were described in the catalog of the University. Five courses were offered. The arrangement made will be understood from the following, which appears on page 67 of the University Catalog for 1934–1935.

> "Any student desiring to take these courses for credit toward an undergraduate degree should notify the Dean or Professor Cheney, who will give him a card entitling him to admission to the course or courses he has selected. The students should present this card at the beginning of the first session of the course."

Total Registration in Adult Courses.—Adult registration was the largest in the history of the Garden. A total of 927 persons registered. The figures for registration for the last few years follow:

Year	*Persons Registered*
1929	764
1930	802
1931	823
1932	908
1933	823
1934	927

One of the duties of this department is to prepare, each week during the school term, a schedule of educational activities for the ensuing week. One of these schedules, appended, illustrates the number and scope of the activities.

BROOKLYN BOTANIC GARDEN CLASS SCHEDULE
May 14–19, 1934

Date	Class	Subject	Lantern	No.
Monday, May 14.....	P. S. 72	Trees	X	80
	P. S. 241	Bklyn. Bot. Gdn.	X	40
	P. S. 26	Bklyn. Bot. Gdn.	X	300
	P. S. 184			
	P. S. 117 Mothers Club	Bklyn. Bot. Gdn.	X	75
	Woman's Club	Lecture		12
	Junior H. S. 96	Transplanting		40
Tuesday, May 15.....	P. S. 150	Bklyn. Bot. Gdn.	X	30
	P. S. 241	Bklyn. Bot. Gdn.	X	40
	Newtown H. S.	Bklyn. Bot. Gdn.	X	30
	P. S. 241	Japanese Garden	X	40
	P. S. 2	Wild Flowers	X	45
	Junior League	Meeting and Address		
	Class: Course B2	Nature Study		20
	Class: Course B7	Greenhouse Work		20
	Visiting Club	Japanese Gardens		
Wednesday, May 16..	Nurses Course, D1	Medicinal Plants		13
	P. S. 129	Bklyn. Bot. Gdn.	X	80
	P. S. 188			120
	P. S. 241	Gardens	X	40
	P. S. 130	The Japanese Gdn.	X	45
	P. S. 184	Bklyn. Bot. Gdn.	X	120
	P. S. 26	Bklyn. Bot. Gdn.	X	90
	P. S. 73	Conservation	X	75
	Berkeley	Nature Study		25
	Torrey Botanical Club	Meeting and Address		
	Class: Course B3	Agric. and Hort.		30
	Dept. Heads, City Schools	Meeting and Address		
Thursday, May 17....	P. S. 68	Bklyn. Bot. Gdn.	X	120
	P. S. 110	Bklyn. Bot. Gdn.	X	100
	Adelphi	Trees	X	30
	Class: Course A18	Ornamental Shrubs		15
	Far Rockaway	Luncheon		
	P. S. 241	Plants of Desert	X	80
	P. S. 159	Wild Flowers	X	45
	P. S. 200	Bklyn. Bot. Gdn.	X	45
	Woman's Club	Lecture		
	Class: Course B1	General Botany		
	Class: Course A18	Ornamental Shrubs		25
Friday, May 18.....	Nurses Course, D1	Medicinal Plants		25
	Brooklyn Training	Bklyn. Bot. Gdn.	X	30
	P. S. 226	Bklyn. Bot. Gdn.	X	200
	P. S. 206	Nature Study	X	40
	P. S. 241	The Japanese Gdn.	X	40
	P. S. 130	Bklyn. Bot. Gdn.	X	45
	Class: Course B1	Laboratory		
Saturday, May 19....	Children's Classes	Outdoor Garden		230
	Field Class: Course A11	Flowers and Ferns		
	Field Class: Course B10	Trees and Shrubs		

Flower Days

Six Flower Days were observed during 1934. The following list gives the dates, leaders, and subjects.

1. Tuesday, April 17. Daffodil Day. Mr. B. Y. Morrison, Head of Division of Plant Exploration and Introduction, U. S. D. A.; Secretary, American Iris Society; Editor, National Horticultural Magazine. "Daffodils."

2. Tuesday, May 22. Rose Garden Day. Mr. Montague Free, Horticulturist, Brooklyn Botanic Garden, and President, American Rock Garden Society. "Styles in Rock Gardens."

3. Tuesday, May 29. Iris Day. Mrs. Colin S. McKinney, Author of "Iris in the Little Garden." "Iris."

4. Tuesday, June 12. Seventh Annual Rose Garden Day. Mr. Montague Free, Horticulturist, Brooklyn Botanic Garden. "Roses and the Winter."

5. Tuesday, June 26. Second Annual Japanese Iris Day. Dr. George M. Reed, Curator, Brooklyn Botanic Garden. Tour of the Japanese Iris Plantations.

6. Tuesday, October 30. Chrysanthemum Day. Mr. Arthur Herrington, Secretary and Manager, International Flower Show; Author of "The Chrysanthemum." "The Chrysanthemum, past and present."

These occasions, which are partly social and partly educational, increase in popularity from year to year. The approximate total attendance was 1425, an average of a little more than 237 persons per "Day." For the smoothness with which the social part of the ceremonies was conducted we are indebted as usual to the efficient services of the Woman's Auxiliary as well as to members of the Junior League and the young women of the Botanic Garden personnel.

Cooperation with the Department of Botany of the Department of Education, Brooklyn Institute

As a result of a cooperative agreement between the Garden and the Department of Botany of the Department of Education, Brooklyn Institute of Arts and Sciences, a series of round table discussions was scheduled at the Garden for the second Wednesdays of November and December, 1934, and of January, February, March, and April, 1935. The programs for the two conferences held in 1934, which were well attended, were as follows:

November 14. Native Plant Gardens. Dr. H. K. Svenson, Associate Curator of Plants at the Garden, presiding.

December 12. Soils. Miss Ellen Eddy Shaw, Curator of Elementary Instruction at the Garden, presiding.

Exhibits

At an exhibit of the College of Pharmacy of Columbia University, from May 28 to June 2 inclusive, the following living

material was supplied by the Brooklyn Botanic Garden: Potted Plants: *Marrubium vulgare*, *Mentha piperita*, *Lycopersicum esculentum*, *Erythroxylon Coca*, *Mimosa pudica*, *Urginea maritima*, *Aloe verascens*, *Convallaria majalis*. Uprooted Plant: *Glycyrrhiza glabra*. Cut Specimens of: *Adonis* sp., *Delphinium* sp., *Ficus carica*, *Coffea arabica*, *Sassafras variifolium*, *Prunus avium*, *Rhamnus cathartica*, *Hamamelis virginiana*, *Vanilla planifolia*, *Amomum cardamon*, *Cinnamomum camphora*.

At a window exhibit of a local pharmacy, the following cut specimens of drug plants were supplied by the Garden: *Pinus Strobus*, *Hamamelis virginiana*, *Prunus serotina*, *Mentha piperita*, *Marrubium vulgare*, *Ricinus communis*, *Linum usitatissimum*, *Matricaria*, *Tanacetum vulgare*, *Coffea arabica*, *Datura Stramonium*, *Aconitum Napellus*, *Nepeta Cataria*, *Humulus Lupulus*, *Cinnamomum camphora*, *Glycyrrhiza glabra*.

For the International Flower Show at Grand Central Palace March 19–24, and the Brooklyn Fall Flower Show at the Fourteenth Regiment Armory, September 25–29, this department had charge of the docentry for the exhibits of the Garden.

Editorial Work and Publicity

As usual, I continued to serve on the board of editors of the *American Journal of Botany*, as editor of the Plant Section of General Biology for *Biological Abstracts*, as editor of the *Brooklyn Botanic Garden Contributions*, and as associate editor of the *Bulletin of the Torrey Botanical Club*. As editor of the *Brooklyn Botanic Garden Leaflets*, I report that nine numbers were issued during 1934.

During the year, 25 news releases, containing 50 articles, were prepared and sent out to the principal metropolitan newspapers. For the most part, the articles dealt with announcements of courses of instruction held at the Garden as well as news concerning the plants in the conservatories and outdoor plantations. In addition to these releases, a notice describing our Cycad collection was sent to *Science* and *Torreya*. Releases dealing particularly with the activities of the Woman's Auxiliary of the Garden were sent out through the Brooklyn Publicity Bureau. A total of 1472 press clippings relating to the Brooklyn Botanic Garden were received, as against 1495 last year.

Miscellaneous Items

Personal Activities of Other Members of the Department.—During the summer, Miss Hester M. Rusk, Instructor, took a six weeks intensive course in genetics at Cornell University. During her vacation, Miss Hilda Vilkomerson, Curatorial Assistant, took courses in Morphology of Vascular Plants and in Physiography of New England at Columbia University. Miss Julia E. Best, School Service Assistant, has been working on the morphogenesis of the leaf of the cotton plant. She is collaborating in this work with Dr. G. S. Avery, of Connecticut College.

Girl Scouts of Wallingford, Connecticut.—During the summer the girl scouts of Wallingford visited the chestnut trial grounds at Hamden, Conn. I, in turn, visited their camp to the north of Wallingford, and talked to them about the various kinds of native trees and shrubs in the neighborhood of their camp, and also spoke on the relative values of different timbers for fuel.

Postcard Bulletins were sent out as usual to members of the Garden: (Feb. 23) telling of the seed catalogs available for consultation in the library; (May 9) telling of the blossoming of 5000 tulips in the beds bordering the experimental plot; and (May 14) announcing the distribution to members of the Garden of 2000 young chrysanthemum plants and 1000 hardy perennials.

Cooperation with New York City Park Department.—During the summer, at the request of Mr. Nelson M. Wells, Chief Planting Designer of the New York City Park Development, I assisted in the naming of trees along a path in Central Park where it is planned to have labels affixed to each species.

Winter injury to the woody plants in the Garden.—In May and June I made a survey of the woody plants in the Garden to determine the amount of damage apparent, as a result of the severe preceding winter. The data obtained from this survey were published in the July issue of the Botanic Garden *Record*.

Bayonne Bridge Development.—In June, with Mr. W. Lynn McCracken, Secretary of the Staten Island Conservation Commission, I visited the Staten Island approach to the new Bayonne Bridge, and made recommendations for planting and development.

Brooklyn Girls Week.—In early May, in connection with the Brooklyn Girls Week, a mimeographed sheet describing the

features of the Garden was prepared for distribution to the girls on their tour of the Garden.

Boy Scout Examinations were given on April 21 for merit badges in Conservation and Botany.

Broadcasts.—Fourteen broadcasts on subjects relating to the Garden were given over WNYC during the year.

Bureau of Information.—Many inquiries of various sorts relating to plants were answered in person, by letter, or by telephone, as usual.

Research Work.—An account of the year's work on breeding the chestnut will be found on pages 59–65 of this report.

Respectfully submitted,
ARTHUR HARMOUNT GRAVES,
Curator of Public Instruction.

REPORT OF THE CURATOR OF ELEMENTARY INSTRUCTION FOR 1934

DR. C. STUART GAGER, DIRECTOR.

Sir: I hereby present my annual report for the Department of Elementary Instruction for 1934.

I would call to your attention in this report some few points in work that are significant in its progress.

My last annual report was a résumé of twenty years of work and it seemed a logical follow-up to make the keynote of our work for the visiting classes last spring the educational opportunities offered by this Garden. Letters were written to the District Superintendents in Brooklyn suggesting that at one of their meetings they place this matter before their principals, recommending that each school send to us at least one class during the spring. The regular poster which we send to schools each year had this statement on it: "These talks and walks are planned so that the boys and girls, the schools, and teachers will be better acquainted with the Brooklyn Botanic Garden and its contribution to education and to happiness in leisure hours." Over 27,000 students with their teachers visited us in school hours as a response, a response that tells its own story. All through this year we have felt results in our work of this renewed interest and

understanding of the schools. The fall work for visiting classes followed its usual lines.

Some figures from our greenhouse work might be considered in the light of progressive service. All plants used for classroom study and supply to schools were propagated in our own greenhouses. In the fall of 1934, 2,680 plants were in the greenhouses ready for fall work, an increase of 1,035 plants over 1933. Over 25,000 seedlings were raised in the spring, and nearly 600 pots of bulbs, including calla lily, Easter lily, and lily-of-the valley were planted last autumn. These figures are not so astonishing when it is known that 3,715 people, children and adults, worked in our greenhouses in 1934. This figure includes Mr. Free's classes as well as the classes in the Department of Elementary Instruction.

A course for adults in Fundamentals of Gardening during the spring, given by Miss Dorward and myself, had a registration of 99.

A great amount of material from our greenhouses is distributed to schools to aid them in their work. Over 1,500 seedlings were sent to school gardens.

The amount of study material sent out and distributed to schools has increased greatly. Two hundred twelve requests were received for such material, representing 3,860 teachers and 171,795 children. Because of the great amount of detail of this work and its time-taking element, Miss Julia Best, who assisted in the same line in the Department of Public Instruction last year, has worked with us too since October of 1934.

The appointment in elementary schools of "Nature Curators" made a great difference in the demands made upon us for conferences to plan lessons in nature study for the schools, and so we changed somewhat our Nature Study course of this year to meet these conditions. The course was planned to give direct help for classroom lessons. Beginning in the fall of 1934, thirty hours' work were given before Christmas, to be continued throughout the spring of 1935. This is an experiment to give Nature Curators a more definite training for immediate needs. This is the only Nature Study course given in this City, I believe, that is planned directly to meet this urgent need.

The seedwork has been put on a more business-like basis, but

FIG. 12. Boys in the Instructional Greenhouse working on special projects in gardening. Department of Elementary Instruction. (8654)

is much handicapped by lack of space in a small and crowded room, a mere slice cut from a larger room. Three-quarters of a million packets of seed are prepared and distributed annually.

Progress in the children's garden during the year has been along the line of student teacher training and practice. It is hoped that during this next year it will be possible to gather together and put into printed form a description of our children's work and the underlying principles upon which it is based. There is a constant and increasing educational demand for such a publication.

Throughout this year there have been certain interesting and outstanding features of work that might well come to your attention. In May the children produced a little play depicting the scope of our work and our service to schools and presented it at the Annual Luncheon of the School Garden Association. It is the custom of this organization each year to ask some school or other organization to present some feature of its work.

A meeting was held at the Garden in November of delegate students from all the school gardens of this Borough to receive the commendation which, by request of Mr. Kilpatrick, this institution each year has given.

There are three distinct sessions of our children's Saturday morning work, fall classes, spring classes, and the outdoor garden, given each year. In that period which comes immediately after Christmas and before the spring session begins, we ask back in small groups some of our honor students. This past year our work at that time came under the headings of "Fun with the Microscope" and "The Making of Wind Instruments," involving an interesting use of plant materials. This latter course was given by Miss Carleen Maley, who volunteered her services for the year to the Department of Elementary Instruction.

We have been honored by a goodly number of visitors, among them friends from abroad, including Mrs. Henry Gage Spicer, member of the London County Council; Dr. E. P. Phillips, Principal Botanist, Division of Plant Industry, Pretoria, South Africa, and Miss Elsie Knight, Principal of one of the elementary schools in London. At their request our printed forms and some of the children's work were sent to them.

Each year we have encouraged some outside gardens in their work with children, gardens with which we have had some direct contact. A medal was given to a member of the Cedarhurst School Garden, a little sister of our garden; one to the children's garden at Cornwall fostered by us; and another to the children's garden at the Brooklyn Home for Consumptives, a garden which one of our own young people has taught and conducted for some years. Two gardens for children were started at Gerrittsen Beach through our work here, both of them taught and managed by our students.

This might be a fitting place and time to thank the Woman's Auxiliary for the money given to the Department, the proceeds of a lecture by Mr. McClintock. The audience was one of children, parents, and teachers. This money made it possible for us to run our children's garden this summer with greater ease and efficiency.

I would also like to thank Mrs. Charles E. Perkins, Chairman of the Woman's Auxiliary, for the donation made for special work of one of our outstanding young people. This afforded an opportunity for one of our older high school people to do some work with Dr. George M. Reed, an opportunity prized highly by our young people who think of going into botanical research.

On September 1, Miss H. Dorothy Jenkins resigned, and Miss Elsie T. Hammond, formerly at the Garden, was appointed in her place.

It has not been possible to accept some of the important requests for speaking that have come this year. The National Recreational Association Congress met in Washington in October and desired a talk on children's work. A similar request came from the Detroit Garden Club and the American Nature Study Society meeting in December with the American Association for the Advancement of Science. These are occasions at which a presentation of our work should be given.

I attended the meeting of the National Education Association in Washington as President of the Department of Science Instruction, a most successful meeting. My term of office expired with this meeting.

In October I gave a talk on the importance of junior garden

work before the presidents of the Federated Garden Clubs of New York.

One lecture was given at the American Museum of Natural History in their regular Nature Study course. It was arranged this year with Miss Farida A. Wiley, of that Museum, that we exchange lectures each year.

I have continued to act as Honorary Secretary of the National Plant, Flower and Fruit Guild; as Chairman of the Nature Craft Committee of the Camp Fire Girls, and as a member of the Advisory Board of the Horticultural College of Southern California. As I have noted before, I served as President of the Department of Science Instruction until July of 1934. I have been asked to be Consultant for the Federated Garden Clubs of New York State, and am also serving as a member of the Tufts Alumni Council and of the Editorial Board of the *Journal of the American Nature Study Society*. During the year I wrote weekly articles, as usual, for *The Sun*—thirty-nine in number—and fulfilled a great many speaking engagements as well as an increasing number of radio lectures.

Respectfully submitted,

ELLEN EDDY SHAW
Curator of Elementary Instruction.

REPORT OF THE CURATOR OF PLANTS FOR 1934

DR. C. STUART GAGER, DIRECTOR.

Sir: Herewith I submit my report for the year ending December 31st, 1934.

TREES AND SHRUBS

The increase in the number of our trees and shrubs is progressing gradually. We now have an extensive collection of woody plants and desirable additions are no longer so numerous. In a number of groups, such as poplars, maples, birches, the available space is nearly taken up. The border mound might perhaps advantageously be used for some less common species or varieties, gradually removing common maples, locusts, privets, etc. In numerous groups we now have nearly all of the more distinct species hardy in this climate. In regard to varieties, forms, and hybrids, it may be a question just where we should draw the line in the

various groups. We are experimenting in the nursery with many species of doubtful hardiness. In a severe winter such as the last, many plants were killed back, yet only very few were killed outright.

Lilacs

Accurate maps locating the two hundred and thirty lilac plants west of the Rose Garden were made in the winter 1933–34. Their identification was taken up in the spring at the time of flowering. The reasonably distinct lilacs have been named and labels have been attached. Of the two hundred and thirty plants, quite a number are identical, and others very nearly so. Many of these were received under different names. Some doubtful ones have been labeled temporarily, with a view to study in 1935. The first of our lilacs were planted eighteen years ago. No special arrangement was followed in the successive plantings since that time. Many of the bushes are now overgrown. Some have been attacked by borers, or are otherwise in poor condition, so that it is now necessary to remove many of them. Of a number of our most desirable forms, cuttings grafted on privet have been started; a number of the best varieties are still lacking. The following is a brief summary:

Summary of Lilac Species

	We Have	Approximate Total Number
Japonica Group	3	4
Vulgaris Group	6	17
Josikaea Group	7	9
	16	About 30 (some not hardy)

Summary of Lilac Varieties

	B*	W†	H‡
Single White	8	9	7
Single Medium	85	53	22
Single Dark	27		
Double White	15	10	5
Double Medium	76	45	25
Double Dark	5		
	216	117	59

* B: Number of plants in Brooklyn Botanic Garden, including duplicates.
† W: Desirable forms according to Wister, 1927.
‡ H: " " " " Mrs. Harding, 1933.

Maps and Lists

It will require another season to complete the new condensed form of maps of trees and shrubs which include the main systematic section, the lilac triangle, the ornamental *Malus* and *Prunus* section, and the nursery. On the left hand sheet facing each map are three typewritten lists:

1. Grounds, that is, plants on the map of the grounds, alphabetically arranged, giving year of accession and source.
2. Nursery, additional species and varieties not yet on the grounds.
3. Desiderata, that is, additional plants in the various groups that we wish to obtain.

Iris

The report of Dr. George M. Reed, in charge of *Iris* plantations, will be found in the statistical report attached hereto, page 88.

Courses

During the spring I gave ten outdoor lessons on "Ornamental Shrubs," studying about two hundred species and varieties at the time of flowering, continued with ten lessons in the fall, studying foliage and fruits.

Visits to Other Institutions

During the spring and again in the fall, I visited the Arnold Arboretum, taking notes comparing their collections with ours. I also collected seeds, and consulted with Mr. Alfred Rehder and others. During August I visited Cornell University, consulting with Dr. K. M. Wiegand and Dr. A. J. Eames.

Labels

Numerous labels have been put on the grounds, comparatively few trees and shrubs now remaining unlabeled.

In the case of the woody plants the labels have been simplified by omitting the hook on the lower buried end of the iron upright. The buried end was originally turned at right angles to the upright to make it difficult for "vandals" to pull up the labels. This precaution has now become unnecessary.

In the case of the lilacs, we have adopted small wooden labels painted light green with black lettering, attached to the branches by lead wire. These have the great advantage of not interfering with lawn mowers.

Statistical report is attached hereto.

Respectfully submitted,
ALFRED GUNDERSEN,
Curator of Plants.

STATISTICS RELATING TO LIVING PLANTS

Living Plants Received:

	Species or Varieties	Plants
By collection	7	113
By exchange	201	560
By gift	364	1,592
By purchase	348	4,283
By seed	6,470	6,470
Total	7,390	13,018

Living Plants Distributed:

To members	7,027
By gift	1,125
By exchange	2,822
Total	10,974

TALL BEARDED IRIS

Received by Exchange:

Mrs. L. W. Kellogg, Over-the-Garden-Wall, West Hartford, Conn.	24 varieties
Mr. Robert Schreiner, Schreiner's Iris Gardens, St. Paul, Minn.	5 "
Mr. Robert Wayman, Bayside, L. I.	14 "
Mr. Howard Weed, Weed's National Iris Gardens, Beaverton, Ore.	10 "
Dr. Orland E. White, University, Va.	1 "

DWARF BEARDED IRIS AND REMONTANTS

Received by Exchange:

Mr. George L. Ehrle, Richfield, N. J.	3 varieties
Mr. Clint McDade, Chattanooga, Tenn.	5 "
Mr. Robert Schreiner, Schreiner's Iris Gardens, St. Paul, Minn.	6 "

Japanese Iris

Received by Exchange:

John Lewis Childs, Inc., Flowerfield, L. I..... 19 varieties

Miscellaneous

Mr. S. Tanaka, Shizuoka, Japan, collected and forwarded to us 4 collections of *I. Kaempferi* var. *spontanea* and 1 Japanese Iris variety.

Iris Species

Received by Exchange:

Dr. Francis Drouet, Columbia, Mo.....	1 species	
Dr. R. A. Harper, Ridgewood, N. J.....	3 "	
Dr. H. Harold Hume, Gainesville, Fla.....	2 "	(11 var.)
Mr. A. E. Kunze, Birmingham, Ala.....	2 "	(8 ")
Dr. Fritz Lemperg, Hatzendorf, Austria.....	4 "	
Mrs. Charles E. Perkins, Brooklyn, N. Y.....	1 "	
Mr. James C. Stevens, Greenville, N. Y.....	2 "	(4 ")
Mr. A. D. St. Romain, New Orleans, La.....	2 "	(9 ")
Mr. L. L. Stuart, New York, N. Y.....	1 "	
Dr. Orland E. White, University, Va.....	1 "	

Labels and Signs

Labels and signs were made by Mr. John McCallum as follows:

Galvanized iron labels for the herbaceous beds.....	299
Lead labels for the woody plants.....	108
Small lead labels for local flora and rock garden.....	76
Small wood labels.....	559
Wooden signs.....	26
Large wood labels.....	21
Hanging labels (lilacs).....	234
Small wood markers for herbaceous beds.....	183
Cardboard signs.....	215
Total.....	1,721

Also numerous miscellaneous numbers and signs.

REPORT OF THE ASSOCIATE CURATOR OF PLANTS FOR 1934

Dr. C. Stuart Gager, Director.

Sir: I submit herewith my report for the year ending December 31, 1934.

The Herbarium

Statistics of the herbarium collections will be found at the end of this report. The most interesting acquisitions are perhaps the

FIG. 13. Systematic Section. Willows along the Brook, planted in the fall of 1912. Facing east. The hedge in the background is of *Lespedeza formosa* and *L. bicolor*. Sept. 22. (8404)

collection of sedges which are being received by the Garden from many corners of the world, in exchange for the determination of material.

The herbarium is gradually being put into order, though with our limited assistance this process will take a long time. A total of 3635 specimens were mounted and 557 specimens remounted. The rather extensive collections from the Pacific Coast States, especially, have not been gone over in recent years, and most of the groups are badly in need of revision. During the past year I have rearranged in large part our collection of the extensive genus *Carex*.

Collections in 1934 totaling 1200 specimens were made by me chiefly from Long Island, the Catskill Mountains, northern New England, and the Gaspé Peninsula.

Mt. Washington in the White Mts. was visited on July 3rd. The season had been early and the alpine *Rhododendron lapponicum*, *Diapensia lapponica*, and *Loiseleuria procumbens* were past bloom, but in the uppermost reaches of the Alpine Garden flowering clumps of *Cassiope hypnoides* and *Loiseleuria procumbens* were still to be found. The golden flowers of *Geum Peckii* and the large-flowered *Houstonia* of the White Mountains (*H. caerulea* var. *Faxonorum*) carpeted the mossy slopes. Labrador tea (*Ledum groenlandicum*) and the mountain sandwort (*Arenaria groenlandica*) were abundant. Each visit to the summit of Mt. Washington results in discovering some plant previously unseen by me, in this instance *Saxifraga rivularis*. In passing it may be noted that the alpine golden-rod, *Solidago Cutleri*, collected on the summit of Mt. Washington by Mr. Montague Free in 1915, has grown luxuriantly since that time in an open bed at the Botanic Garden.

Plants were collected along the estuary of the St. Lawrence River below Quebec, although the season was not sufficiently advanced to see the great variation in the genus *Bidens*, or to find the endemic gentian of these tidal shores, *Gentiana Victorinii*, which I saw on my previous visit to the St. Lawrence estuary in 1923.

It is along the newly opened road around the Gaspé Peninsula that the most spectacular plants will be seen. From Bic east-

ward, the cliffs adjacent to the sea harbor such interesting ferns as *Asplenium viride*, *Woodsia alpina* and *scopulina*, *Thelypteris fragrans* (especially abundant on the talus slopes at Cap Chat River), *Cryptogramma Stelleri*, and *Polystichum Braunii*. The wet rocky slopes at Mt. St. Louis were especially bright with the pink *Hedysarum boreale*, *Saxifraga Aizoon* and *S. aizoides*, *Senecio obovatus*, and *Parnassia parviflora*. The most brilliant display, throughout areas where acid soil conditions predominated, was made by the common lamb-kill, *Kalmia angustifolia*.

Local Flora Section

This section may be considered as slowly approaching maturity and consequently few changes were made during the past year. Portions of the bog were becoming overgrown with grasses and the surface layer of peat in these areas was replaced. Several large boulders were added last spring to the wall which bounds the bog to the southward. These boulders should provide better shade conditions for the northern plants such as *Linnaea borealis*, *Chiogenes hispidula* and *Cornus canadensis*, which have already become well established in this locality. A pathway of stone flags has been constructed around the bog which will greatly facilitate walking. Extension of the sand-area and planting of pitch-pines is gradually making a natural background for pine-barren plants such as *Hudsonia* and *Corema* which are still thriving. Six hundred additional plants of *Trillium grandiflorum* were set out in the woodland area; the plantings of *Mertensia virginica* and of *Veratrum viride* were considerably increased. The European privet bushes and willow trees which constituted a large part of the original planting of this area are being gradually removed and replaced by native species.

Only two areas remain in an unattractive condition. One of these is the eastern end, where we still hope for a limestone wall, similar to one of the waterfall ledges in the Japanese Garden, on which walking-fern and similar plants can be grown. The other area is at the western end of the enclosure, where there is need for a landscaped pathway and a considerable amount of soil improvement.

Classes

Beginning January 8th six remaining sessions of the course in General Botany, as well as six sessions of the course in Plant Identification, both begun in the fall of 1933, were concluded at the Horticultural Society of New York. On October 8th a new series of fifteen sessions, a repetition of the course on Plant Identification was begun at the Horticultural Society. Nine of the fifteen scheduled meetings were given by the end of 1934; the remaining six to continue on in 1935.

Statistics from the herbarium will be found appended to this report.

Respectfully submitted,

Henry K. Svenson,
Associate Curator of Plants.

Herbarium Material Borrowed for Study

California Academy of Sciences	236
Copenhagen, Botaniske Museum	25
Field Museum of Natural History, Chicago	13
Gray Herbarium, Harvard University	63
University of Michigan, Ann Arbor	9
New York Botanical Garden	350
Philadelphia Academy of Natural Sciences	14
U. S. National Herbarium, Washington, D. C.	13
Mr. Louis C. Wheeler, U. S. Forest Service, Calif.	8
Total	731

Herbarium Material Loaned to Other Institutions

Bailey, Mr. L. H., Ithaca, N. Y.	15
Gleason, Dr. H. A., New York Botanical Garden	2
Mackenzie, Mr. K. K., New York	3
Manning, Dr. W. E., Smith College	1
Moldenke, Mr. Harold N., New York Botanical Garden	17
Palmer, Mr. E. J., Arnold Arboretum	1
Pennell, Dr. F. W., Philadelphia Academy of Nat. Sciences	1
Total	40

Herbarium Accessions and Distribution

Phanerogamic Herbarium

Accessions:		
By Gift:		
Collin, Mrs. Louise Merritt	1,200	
Drushel, Dr. J. A.	128	
Elwert, Mr. Max A.	1	
Fitzpatrick, Mrs. M. J.	1	
Hanmer, Mr. Charles C.	735	
Kittredge, Miss E. M.	6	
St. John, Mr. R. R.	18	
Svenson, Dr. Henry K.	3	2,092
By Exchange:		
California, University of	174	
Deam, Mr. C. C., Bluffton, Ind.	19	
Demaree, Dr. D., Indianapolis	174	
Fassett, Dr. Norman C., Univ. of Wisconsin	77	
Goodgame, Mr. Allen, Essex, Mont.	2	
Gray Herbarium, Harvard University	5	
Grover, Dr. Frederick, Oberlin College	236	
Hotchkiss, Dr. Neil, Biological Survey, Wash., D. C.	1	
Kew, Royal Botanic Gardens, England	1	
New York Botanical Garden	15	
Philadelphia Academy of Natural Sciences	42	
Reeves, Prof. R. G., Agr. and Mech. College, Tex.	1	
Sharp, Mr. A. J., Univ. Tennessee	1	
Smith College, Northampton, Mass.	204	
Thompson, Mr. J. W., Seattle, Wash.	698	
Wheeler, Mr. Louis C., U. S. Forest Service, Calif.	14	1,664
By Purchase:		
Kittredge, Miss E. M., Vergennes, Vt.	52	
Schimpff, Dr. H. J. F., Ecuador	384	
Steyermark, Mr. Julian A., St. Louis	98	
Tharp, Prof. B. C., University of Texas	252	786
By Collection:		
Graves, Dr. A. Harmount, Brooklyn Botanic Garden	40	40
Total		4,582
Distribution:		
By Exchange:		
California, University of	111	
Denslow, Mrs. Cornelius, Brooklyn	1	
Gray Herbarium, Harvard University	1	
Kew, Royal Botanic Gardens, England	1	
Missouri Botanical Garden, St. Louis	80	
Philadelphia Academy of Natural Sciences	60	
Thompson, Mr. J. W., Seattle, Wash.	166	420
Total		420

Cryptogamic Herbaria

Accessions:		
Fungi:		
By Exchange:		
Dr. Tr. Savulescu, Bucharest, Roumania	200	
By Gift:		
Dr. Robert Hagelstein, Mineola, L. I.	115	
By Purchase:		
Dr. W. Migula, Eisenach, Germany	50	
Dr. H. Sydow, Berlin, Germany	250	615
Total		615
Other Cryptogams:		
By Purchase:		
Dr. W. Migula, Germany	125	
Fr. Verdoorn, Leiden, Holland	50	175
Total		175

Seed Exchange

Seed Packets Received:		
By Collection	66	
By Exchange	2,179	
By Gift	63	
By Purchase	56	2,364
Total		2,364
Seed Packets Distributed:		
By Exchange	3,076	
To Members	912	3,988
Total		3,988

REPORT OF THE HORTICULTURIST AND HEAD GARDENER FOR 1934

Dr. C. Stuart Gager, Director.

Sir: I submit herewith my report for the year ending December 31, 1934.

Personnel

The gardening force (part of which is on the per diem payroll) was increased to ten men by the addition of one man, who, from the beginning of April, was assigned to the Local Flora Section. The collections are constantly being augmented and trees and shrubs are growing larger, necessitating the expenditure of more

labor in spraying, pruning, etc., so that this force is inadequate for the proper maintenance of the garden. If the contemplated planting of the North Addition is carried through in the spring of 1935, three additional gardeners will be urgently needed.

The laboring force suffered the loss by death on November 24 of Mr. Victor Zalewski, who had faithfully served the Botanic Garden since 1913.

Labor Paid for by Charitable Organizations

Throughout the year, thirty-nine men, whose wages were paid by charitable organizations, worked for a total of 2,596½ days, as compared with fifty-nine men who worked for a total of 3,955½ days in 1933.

Brooklyn Bureau of Charities.....	39 men	(8 hrs. per diem)	2,471½ days
Civil Works Administration.....	2 "	(6 " " ")	125 "

General Systematic Section

The two tulip beds in the systematic section were trenched, fertilized, and replanted. The late-flowering tulips are well represented in the border along the Experimental Plot, so they were eliminated from the systematic section, their places in the west bed being taken by forty varieties of early flowering garden tulips. The east bed is given up to "wild" tulips—40 species and varieties.

Thirteen beds in the Campanulales area and nine beds in the Caryophyllales area were double dug, fertilized, and the perennial plants reset.

Because of their poor growth, the *Clethra* shrubs on the island in the terminal pool were transferred to Azalea Knoll.

The collection of *Chaenomeles* species and varieties was transferred from the eastern part of the Pomaceae area to a position near the main walk. This is one of many minor transplanting operations carried out with a view to improving the arrangement of the collections and the appearance of the Garden.

As an aftermath of the severe winter of 1933–34, five men for one week, and two men for two weeks, were engaged in pruning dead and injured wood from plants in the systematic section and elsewhere on the grounds.

Japanese Garden

In the spring, 5 White Pines, 12 Mugho Pines, and 12 Japanese Maples were planted in the Japanese Garden. In the fall, 30 Mugho Pines and 30 Japanese Yews were planted. This work was done under the direction of Miss Averill.

Much time was occupied in preventing the East Indian Lotus and Cattails from completely over-running the lake. This work was done by mowing with scythes the outskirts of the stands—the operation being conducted from a boat.

Conservatories

The collection of Stapeliads was greatly enriched by contributions from the White-Sloan Stapelia collection.

In all, species to the number of 140 were added to the cactus and succulent house, including the following varieties: *Stapelianthus Decareyi*, *Mammillaria Schumannii*, *Coryphantha Nellieae*, *Cereus vagans*, *C. Donkalaeri*, *Rhipsalis heteroclada*, *R. elliptica*, *Haworthia pallida*, *Stapelia Schinzii*, *Tavaresia grandiflora*.

Rock Garden

Owing to the conditions under which it was built, the soil in the major portion of the rock garden never was properly prepared for the growth of alpine and rock plants. In the fall, a start was made to rectify this by removing the soil over a considerable area and replacing it with a mixture of stone chips, sand, soil, and humus to a depth of two and a half feet.

Over 450 feet of protective railing of cedar posts, which had decayed, was replaced with new posts.

The Federated Garden Clubs of New York State, through Mrs. William C. Meissner and Mrs. Carl L. Otto, presented the Garden with 71 species and varieties of *Sedum*, and 60 species and varieties of *Sempervivum*. These, at present, are being cared for in the cold frames, but as they are propagated they will become available for planting in the rock garden.

Rose Garden

As a result of the severe winter, many of the rambler and climbing roses were severely injured, some were killed to the ground, and others killed outright.* In consequence, our display of this type of roses was nowhere near normal.

* Brooklyn Botanic Garden Record, Vol. XXIII, No. 3, July, 1934.

The best roses of the season were produced in August. The unusual heat of late May and early June forced the Hybrid Teas into early bloom of poor quality. The blooming season for the Hybrid Tea roses extended from May 25th to December 7th.

Massey dust for the control of fungous diseases was applied thirty times between April 25th and November 5th.

Ornamental Planting

Twenty flowering crab apples, which were becoming crowded in the planting west of the Japanese Garden, were transplanted to the Museum Embankment.

Over 60 named varieties of hardy Chrysanthemums were added to our collection.

The Tulip border along the fence of the Experimental Plot was trenched, and the bulbs replanted to make (we hope) a more effective display.

The sticky soil of the border west of Azalea Knoll, in which the Azaleas failed to grow, was removed and replaced with sandy soil mixed with peat moss.

North Addition

Considerable work devolved on the laboring force as a result of the work on the North Addition by Civil Works Administration workers under the direction of our landscape architect, Mr. Harold A. Caparn. Three catch basins were moved and reset, a new catch basin installed, and over 150 feet of storm-sewer pipe laid. Over 260 feet of 2″ water pipe and over 150 feet of 1″ pipe was laid, and 5 faucets attached. In addition to various odds and ends of grading, over 28,000 square feet was planted with lawn seed.

Miscellaneous

In the lake and along the brook, *Iris pseudacorus* had increased by self-sown seeds to such proportions that it had become a pest. Consequently, as many as possible of them were removed in the fall.

About ten tons of rock used in setting up the rock garden exhibit of the Mayfair Nurseries at the Brooklyn Fall Flower Show were transported to the Garden for use in the Local Flora Section.

These rocks were donated by Mr. Marcel Le Piniec of the Mayfair Nurseries.

Ten concrete posts were made and set to support a barbed wire fence at the south end of the Children's Garden.

A "dug-out" toolhouse, 8′ × 7′ × 5′, was constructed of concrete in the border mound near the Rose Garden. This is for the use of men working in the northern part of the grounds.

A concrete "dug-out," 4′ × 3½′ × 3½′, for gasoline storage, was constructed in the service yard.

About 180 feet of concrete drain pipes were laid in the garden of the Conservatory Plaza.

Broken flagstones, obtained from the Park Department, were used by lay 540 square feet of walk on Boulder Hill, and 480 square feet of walk across the Koelreuteria Triangle.

Northeast of the Japanese Garden an area of 6000 square feet of soil was graded and seeded to lawn, and an area of 4800 square feet was seeded in the vicinity of the Overlook.

Exhibits

At the Twenty-first Annual International Flower Show, March 19–24, the Botanic Garden's Exhibit of Methods of Pruning, covering 800 square feet of space, was awarded a Gold Medal. In connection with this exhibit, I prepared two Leaflets,* one describing the exhibit, and the other, a "double number," discussing pruning in general.

At the same Flower Show, we put up a display of about forty Crocus species and varieties covering 72 square feet for which we received a Special Prize.

A plant of *Ceratozamia mexicana* bearing a male cone was awarded a Botanical Certificate.

At the Brooklyn Fall Flower Show, September 25–29, we installed an exhibit of Xerophytic plants, covering a space 20′ × 20′. In this exhibit 9 plant families, 54 genera and 114 species were represented. For this exhibit, we were awarded a Special First

* Brooklyn Botanic Garden *Leaflets*. Ser. XXII, No. 3–4, Mar. 21. Pruning Ornamental Trees and Shrubs.

Brooklyn Botanic Garden *Leaflets*. Ser. XXII, No. 5, Mar. 21. The Exhibits of the Brooklyn Botanic Garden at the Twenty-first International Flower Show.

FIG. 14. Exhibit of the Garden at the International Flower Show, March 19–24, 1934. (Herbert Studios, 2270)

Prize. We also showed a miniature cactus rock garden which received a Special Prize.

At various monthly meetings of the Horticultural Society of New York, we exhibited as follows:

February 21. Tropical Rock Garden. Award of Commendation and Special Prize.

April 18. Vase of *Polygala dalmaisiana*. Award of Appreciation.

Miniature Rock Garden with *Draba Aizoon*, *Draba armata*, *Androsace carnea*. Award of Appreciation.

Demonstration of propagation of *Ficus elastica* by single eye scions grafted on piece roots, and by leaf and bud cuttings. Award of Commendation.

Collection of Cut Flowering Shrubs. First Prize.

May 16. Vase of Caucasus Bladdernut, *Staphylea colchica*. Award of Appreciation.

Vase of Manchurian Crab, *Malus baccata var. mandshurica*. Award of Merit.

Vase of Tulips. Third Prize.

June 20. Flat of *Leavenworthia stylosa*. Award of Commendation.

Drosera binata. Botanical Certificate.

Seed and Plant Distribution

In connection with the International Seed Exchange, 3,998 packets of seeds were distributed to foreign and domestic botanic gardens and to other institutions and individuals during the spring of 1934.

Surplus plants of hardy Chrysanthemums, etc., totaling 6,200, were distributed to 330 Botanic Garden members in May.

We also supplied plants to the following public institutions:

Pilgrim State Hospital—Cuttings of woody plants, 1,125.

Fire Department, Telegraph Station—Tulip bulbs, 250.

Park Department, New York—Hardy Nymphaea divisions, 2,600.

Iowa State College of Agriculture—Hardy Nymphaea divisions, 90.

Courses of Instruction

I conducted the following "Courses for Members and the General Public" at the Botanic Garden:

Practical Gardening. A Saturday afternoon course. Five talks with demonstrations.

Plants in the Home. Five talks with demonstrations.

Personal Activities

I acted as a judge at the following flower shows:

March 19. International Flower Show, New York City.

June 21. Horticultural Classes, Long Island Flower Show, Stony Brook.

August 2. Flower Show of the Garden Club of the Consolidated and Affiliated Gas Companies. New York City.

September 18. Federated Garden Clubs of New York State exhibits, Exhibition of the Queens-Nassau Agricultural Society. Mineola, L. I.

On September 24 I assisted in judging rose novelties in the test garden in Elizabeth Park, Hartford, for the American Rose Society.

By invitation, I attended a conference in Washington, D. C., on October 27 concerning the proposed National Rose Garden.

I was elected President of the American Rock Garden Society on March 21. The newly formed Society had its first annual meeting at the Brooklyn Botanic Garden on May 22, in conjunction with Rock Garden Day.

I was elected an Honorary Life Member of the Alpine Garden Society of England in the fall.

I continued to serve as Horticultural Consultant for the Federated Garden Clubs of New York State.

The Twentieth anniversary of my association with the Brooklyn Botanic Garden occurred in March. I want to take this opportunity of expressing my appreciation of the consideration always extended to me by the Trustees, the Governing Committee, and the Director of the Garden.

Respectfully submitted,

Montague Free,

Horticulturist and Head Gardener.

REPORT ON THE LIBRARY FOR 1934

DR. C. STUART GAGER, DIRECTOR.

Sir: Since the librarian is still absent because of illness, the report on the library is herewith presented by the assistant in charge.

ACCESSIONS

In 1934, 619 volumes and 644 pamphlets were added to the library, which now consists of 18,525 volumes, 14,744 pamphlets, a total of 33,269 pieces. Of the year's accessions, 107 volumes, 397 pamphlets and 891 parts, including current numbers of 77 periodicals, were received as gifts.

Among the year's gifts was an autographed letter of the botanist Robert Brown, written to Sir Charles Lyell, the eminent geologist. This was presented to us by Lord Lyell and the Honorable Lady Langman, the previous owners, through the kind offices of James Cumming, County Clerk, and the Town Council of Montrose, the birthplace of Robert Brown. The letter is concerned with specimens of fossil woods which he is sending to his correspondent, and considering the scientific prominence of both men, is a most interesting item. Photographs of a bust of Robert Brown, in Montrose, were also sent us by the Town Council, to help the sculptor who was modeling one for the Brooklyn Botanic Garden, a project of the Civil Works Administration. Other gifts of special importance to us were the following:

62 parts and 54 pamphlets given by the American Fern Society.
12 volumes for the Children's Club Room, given by the Brooklyn Botanic Garden Boys' and Girls' Club.
10 volumes given by the Century Association, New York.
1 volume given by Dr. Albert Lemée, Brest, France. This was V. 5 of "Dictionnaire descriptif . . ." which has been presented by Dr. Lemée for several years.
44 volumes given by the Minnesota Horticultural Society.
36 parts of "House and Garden" given by Mrs. D. Sherman Taber, Flushing, L. I.

A complete list of donors will be found in Appendix 1.

The periodicals listed as exchanges number 757, as gifts, 77, as purchases, 136, and by publication, 7, making a total of 977

titles received during the year, two less than in 1933. Some new titles have been added to our lists, but some publications usually sent as gifts and exchanges were not issued.

LIST OF SOME IMPORTANT ACCESSIONS

Autograph Letters

Robert Brown, 1842. Stephen Hales, 1757.

Association Books

Brown, Robert. Prodromus florae Novae Hollandiae. London, 1810. Author's presentation copy. Inscription on fly-leaf, "For Joseph Hooker, Esqr., with best wishes for his success and happiness from his friend R. Brown. Aug., 1829."

Darlington, William. Flora Cestrica. West Chester, Penn., 1837. Author's presentation copy to Dr. F. Boott, with A.L.S. of author inserted.

Gleditsch, J. G. Systema plantarum a staminum situ. Berlin, 1764. Author's presentation copy.

Gray, Asa. A manual of the botany of the Northern United States. Boston, 1848. Author's presentation copy to Dr. F. Boott, with A.L.S. of author inserted.

Torrey, John and Asa Gray. A flora of North America. V. 1, pt. 1. New York, 1838. G. Bentham's copy from the authors.

Pre-Linnean Works

Bartholomaeus Anglicus. De proprietibus rerum. Strassburg, 1491.

Cusa, Nicolaus de. Opera. 3 vols. in 2. Paris, 1514.

Evelyn, John. The French gardiner. London, 1658.

Gesner, Conrad. Catalogus plantarum latine, graece, germanice & gallice. Tiguri, 1542. (First edition.)

Gmelin, J. G. Sermo academicus de novorum vegetabilium. . . . Tubingae, 1749. (First edition.)

Haase, C. F. De sexu plantarum. Lipsiae, 1737.

Kaempfer, Engelbert. Histoire naturelle . . . du Japon. 2 vols. La Haye, 1729.

Nollet, J. A. Recherches sur les causes particulières des phénomènes electriques. Paris, 1749. (First edition.)

Parkinson, John. Paradisi in sole. London, 1656. (Second edition.)

Porta, G. B. Phytognomonica. . . . Neapoli, 1588. (First edition.)

Porta, G. B. Villae libri XII. Francofurti, 1592.

Ruel, Jean. De natura stirpium libri tres. Basileae, 1537.

Vallisnieri, Antonio. Dialoghi sopra la curiosa origine di molti insetti. Venice, 1700.

Zanonius, Jacobus. Rariorum stirpium historia. Bononiae, 1742. (First Latin edition.)

Additions to the Linnaean Collection

Linné, Carl von. Adonis Stenbrohultensis. Stockholm, 1920. Reprint of the 1732 edition.

———. Amoenitates academicae, seu dissertationes. 7 vols. Lugduni Batavorum, 1749–69.

———. Critica botanica . . . seu Fundamentorum botanicorum pars IV. Lugduni Batavorum, 1737.

———. Genera plantarum. Holmiae, 1764. (Sixth edition.)

———. Hortus Upsaliensis, exhibens plantas exoticas. . . . Stockholm, 1748. V. 1. (First edition.)

———. Mantissa plantarum. Holmiae, 1771. (Second edition.)

———. Praelectiones in ordines naturales plantarum. Hamburg, 1792.

———. Reisen durch Oeland und Gothland im Jahr 1741. Halle, 1764.

———. Species plantarum. 2 vols. Holmiae, 1762–63. (Second edition.)

———. Systema naturae. Stockholm, 1748. (Sixth edition.)

———. Systema plantarum . . . editio novissima. Francofurti ad Moenum, 1779–80.

British Museum (Natural History). Catalogue of the works of Linnaeus. London, 1933. (Second edition.)

General Accessions

Aiken, G. D. Pioneering with wildflowers. Putney, Vt., 1933.

Allyn, R. S. The first plant patents. [Brooklyn, N. Y., 1934.]

Arthur, J. C. Manual of the rusts in United States and Canada. Lafayette, Ind., 1934.

Bailey, L. H. The cultivated conifers in North America comprising the pine family and the taxads. New York, 1933.

———. How plants get their names. New York, 1933.

Baker, F. S. Theory and practice of silviculture. New York, 1934.

Bean, W. J. Trees and shrubs hardy in the British Isles. V. 3. London, 1933.

Bose, J. G. Growth and tropic movements of plants. London, 1929.

Brown, H. P. and Panshin, A. J. Identification of the commercial timbers of the United States. New York, 1934.

Buller, A. H. R. Researches on fungi. V. 5. New York, 1933.

Coker, W. C. and Totten, H. R. Trees of the southeastern states. Chapel Hill, 1934.

Cold Spring Harbor Symposia on quantitative biology. V. 1. 1933.

Cooney, (Mrs.) L. M. (compiler). Garden history of Georgia, 1733–1933. Atlanta, Ga., 1933.

Cox, E. H. M. Farrer's last journey. Upper Burma, 1919–20. London, 1926.

Darwin, Charles. Diary of the voyage of H. M. S. Beagle, edited from the MS by Nora Barlow. New York, 1933.

Earle, John. English plant names from the tenth to the fifteenth century. Oxford, 1880.

Graves, H. S. and Guise, C. H. Forest education. New Haven, 1932.
Gunther, R. T. ed. The Greek herbal of Dioscorides. Oxford, 1933.
Harding, Alice (Mrs. Edward). Lilacs in my garden. New York, 1933.
Hasselquist, Frederick. Voyages and travels in the Levant; in the years 1749, 50, 51, 52. London, 1766.
Herzog, Theodor. Pflanzengeographie. Potsdam, [c1933.]
Hole, S. R. A book about roses. New York, [1869; 1933.]
Hunter, H. and Leake, H. M. Recent advances in agricultural plant breeding. Philadelphia, 1933.
Hutchinson, J. Families of flowering plants. V. 2. Monocotyledons. London, 1934.
Imms, A. D. A general textbook of entomology. New York, 1934. (Third edition.)
Johnson, G. W. A history of English gardening. London, 1829.
Jussieu, Antoine de. Traité des vertus des plantes. Paris, 1772.
Kaempfer, Engelbert. Icones selectae plantarum quas in Japonia collegit et delineavit. Londini, 1791.
Koehn, Alfred. The art of Japanese flower arrangement. (Ikebana). Japan, 1933.
Lindley, John. Rosarum monographia; or, A botanical history of roses. London, 1820.
Mason, Frances. ed. The Great Design. New York, 1934.
Matsumura, Jinzō. Shomubutsu mei-i. Enumeration of selected scientific names. . . . Tokyo, 1895.
Pasteur, Louis. Etudes sur le vinaigre. Paris, 1868.
Priestley, Joseph. Experiments and observations relating to various branches of natural philosophy. V. 1–2. London, 1779–81.
Raunkiaer, Christen. The life forms of plants and statistical plant geography. Oxford, 1934.
Record, S. J. Identification of the timbers of temperate North America. New York, 1934.
Sadler, A. L. The art of flower arrangement in Japan. New York, 1933.
Schnarf, Karl. Vergleichende Embryologie der Angiospermen. Berlin, 1931.
Siebold, P. F. Synopsis plantarum oeconomicarum universi regni Japonici. [Batavia, 1830.] [Reprint, Tokyo, 1933.]
Silveus, W. A. Texas grasses. [San Antonio, Texas], 1933.
Small, J. K. Manual of the southeastern flora. New York, 1933.
Smith, G. M. The fresh-water algae of the United States. New York, 1933.
Stanford, E. E. Economic plants. New York, 1934.
Stuhr, E. T. Manual of Pacific Coast drug plants. [Lancaster, Pa.], 1933.
Swartz, Olavo. Observationes botanicae. Erlangae, 1791.
Thunberg, C. P. Voyages de C. P. Thunberg au Japon. 4 vols. Paris, 1796.
Tucker, E. M. Catalogue of the library of the Arnold Arboretum. V. 1–3. Cambridge, Mass., 1914–33.
Tulasne, L. R. and Tulasne, Charles. Selecta fungorum Carpologia; translated into English by W. B. Grove. 3 vols. Oxford, 1931.

Tupper, J. P. An essay on the probability of sensation in vegetables. London, 1811.
Veitch, J. H. A traveller's notes . . . of a tour through India . . . during the years 1891–1893. Chelsea, 1896.
Ventenat, E. P. Description des plantes, nouvelles et peu connues, cultivées dans le jardin de J. M. Cels. Paris, 1800.
Watt, J. M. and Brandwijk, M. G. Breyer-. Medicinal and poisonous plants of Southern Africa. Edinburgh, 1932.
Williamson, J. Ferns of Kentucky. Louisville, 1878. (Small edition.)

Periodicals

Annual review of biochemistry. V. 3, 1934.
Archiv für die Botanik. Leipzig, 1896–99.
Bonplandia. Zeitschrift für die gesammte Botanik. V. 1–10, 1854–62.
Botaniska Notiser. 16 vols. 1888–1910.
Canadian journal of research. V. 1–10, 1929–34.
Fortschritte der Botanik. V. 1, 1931+. (Subscription.)
Germany. Biologische Reichsanstalt für Land und Forstwirtschaft. Arbeiten. V. 1–6, 1900–08.
Revue de cytologie et de cytophysiologie végétales. V. 1, 1934+. (Subscription.)
Trinidad and Tobago, Dept. of Agriculture. Flora of Trinidad and Tobago. V. 1–2, Pt. 1, 1928–32.

Indices to Periodicals

Journal of biological chemistry. Index to V. 76–100, 1928–33.
Journal of pomology and horticultural science. Index to V. 1–10, 1919–32.
Svensk botanisk Tidskrift. Index to V. 1–20, 1907–26.

Service to Readers

In spite of the decreased income for books, periodicals, and binding, the library has tried to serve its purpose of preserving and making readily available for scientific use current botanical literature as well as standard works. Daily routine has been simplified so that the assistants could attend to requests from the scientific staff, other institutions, members of the Garden, and the public in general, who come to the library for help, but little leeway was left for the study of library problems and no special work was undertaken this year. About 250 newly bound volumes were prepared and replaced on the shelves. Lists on various subjects, such as cross-pollination of flowers by insects, material on flower arrangement, history of garden making, the culture and use of gourds, starch formation in plants, were prepared for students, and other material was assembled on request, for the

members of the staff. As occasion arose, small exhibits were made of seed catalogs, books, illustrations, etc. Members of the American Fern Society spent one Saturday morning visiting and inspecting the library, and were interested to learn of the disposal of the fern books belonging to their association. For the lecture on Japanese Flower Arrangement, one of a course given under the auspices of the Brooklyn Botanic Garden Woman's Auxiliary, a selection of books and prints was placed in the auditorium. "Daffodil Day," April 17, was signalized by a special display of material on the origin, culture, and varieties of this flower.

Interlibrary Loans

In 1934, 55 volumes were loaned to: Abraham Lincoln High School, Brooklyn, N. Y.; Boyce Thompson Institute, Yonkers, N. Y.; Brooklyn Children's Museum; Brooklyn Museum Library; Brooklyn Public Library; Carnegie Institution of Washington, Dept. of Genetics, Cold Spring Harbor, L. I.; Columbia University Library, New York; Duke University Library, Durham, N. C.; Hunter College, New York; Iowa State College, Ames, Ia.; New Jersey Agricultural Experiment Station, New Brunswick, N. J.; New York Botanical Garden; Newark Public Library; Rockefeller Institute for Medical Research, New York; Union Carbide and Carbon Corp., New York; Vassar College Library, Poughkeepsie, N. Y.

We borrowed 46 volumes from: American Geographical Society, New York; American Museum of Natural History, New York; Brooklyn Museum Library; Brooklyn Public Library; Columbia University Library, New York; Medical Society of the County of Kings, Brooklyn, N. Y.; New York Botanical Garden; New York State College of Agriculture, Cornell University, Ithaca, N. Y.

The statistical report follows.

Respectfully submitted,

Emilie P. Chichester,

Library Assistant in Charge.

STATISTICAL REPORT ON THE LIBRARY

ACCESSIONS

	Autograph Letters	Portraits	Volumes	Pamphlets	Parts (Including Periodicals)
Exchange	0	0	30	128	3,519
Gift	21	22	107	397	891
Publication	0	0	0	105	55
Purchase	1	9	234	14	901
By binding	0	0	248	0	0
Total	22	31	619	644	5,366

Total number of volumes in library, December 31, 1933	17,906
Number of volumes added during 1934	619
Total number of volumes in library, December 31, 1934	18,525
Total number of pamphlets in library, December 31, 1933	14,100
Number of pamphlets added during 1934	644
Total number of pamphlets in library, December 31, 1934	14,744
Total number of volumes and pamphlets in library, December 31, 1933	32,006
Net increase of volumes and pamphlets during 1934	1,263
Total number of volumes and pamphlets in library, December 31, 1934	33,269

American Fern Society Collection

Number of volumes, December 31, 1933	39
Number of volumes added during 1934	3
Total number of volumes, December 31, 1934	42
Number of pamphlets, December 31, 1933	162
Number of pamphlets added during 1934	77
Total number of pamphlets, December 31, 1934	239
Number of parts added during 1934	81

Serials and Periodicals

(Including only those of which numbers were received in 1934)

Subscription	136
Gift	77
Exchange	757
Publication	7
Total	977

Cataloging

Books, Pamphlets, and Serials cataloged	772
Total number of cards typewritten and filed	2,080

Printed Cards

Torrey Botanical Club index cards on file, December 31, 1933	46,071
Filed during 1934	2,029
Total, December 31, 1934	48,100

Miscellaneous

Number of users of the library	4,200
Books lent to members of the staff	1,369
Books lent to other institutions	55
Books borrowed from other institutions	46

REPORT OF THE RESIDENT INVESTIGATOR (FERNS) FOR 1934

Dr. C. Stuart Gager, Director.

Sir: I submit herewith my report for the year ending December 31, 1934.

School Service

In connection with the chairmanship of the Program Committee of the New York Association of Biology Teachers and in conference with the President, Mr. Julius M. Johnson, a program has been arranged for the academic year, 1934–35. Four of the addresses are concerned largely with phases of cellular biology; viz., bacterial variation, cancer research, the mitotic figure, and structure of the plant-cell wall.

Editorial Work

During 1934, the twenty-fourth volume of the American Fern Journal was issued. Actually, the Fern Journal began its twenty-fifth year with the issuance of No. 3 of this volume.

The loan volumes of the Fern Society Library have been in considerable demand, and this service has furnished a basis for some new research—specifically, a paper on Florida ferns to be issued shortly in the pages of the Fern Journal.

There has been continued interest in the matter of technical methods of fern culture. Correspondence has been carried on with a number of Florida growers, interested to use agar nutrient medium.

Conservation of Native Plants

There seems to be perennial interest in this topic. From time to time, correspondents write in for literature, and some of the Brooklyn Botanic Garden *Leaflets* continue to be useful material for such correspondents.

It is a matter of considerable interest to learn that the present Federal governmental projects include the establishment of sanctuary tracts. While, to a considerable extent, these are designed to serve as refuges for wild animal life, the value for the preservation of native plant species is also recognized. It has been a chief thesis of most of the conservation literature which has issued from the Botanic Garden that the establishment of sanctuaries is a matter of fundamental importance.

Respectfully submitted,

Ralph C. Benedict,
Resident Investigator (Ferns).

FINANCIAL STATEMENT FOR 1934

I. Tax Budget Accounts

1530 *Personal Service:* (*Regular Employees*)			
1531 " " (*Temporary Employees*)			
Appropriation			$ 67,820.22
Expended			67,820.22
Other Codes than Personal Service:			
Code 1532 Fuel Supplies:			
Appropriation	$ 2,500.00		
Transferred from Debt Service, Interest on Temporary Debt	3,133.03		$ 5,633.03
Expended			5,633.03
Code 1533 Office Supplies:			
Appropriation			$ 400.00
Expended			400.00
Code 1534 Laundry, Cleaning and Disinfecting Supplies:			
Appropriation			$ 130.00
Expended			98.19
Balance, December 31, 1934			$ 31.81
Code 1535 Botanical and Agricultural Supplies:			
Appropriation			$ 2,000.00
Expended			1751.07
Balance, December 31, 1934			$ 248.93

Code 1536	Motor Vehicle Supplies:		
	Appropriation		$ 100.00
	Expended		72.76
	Balance, December 31, 1934		$ 27.24
Code 1537	General Plant Supplies:		
	Appropriation		$ 275.00
	Expended	$ 175.19	
	Transf. to Code 1543	92.40	267.59
	Balance, December 31, 1934		$ 7.41
Code 1538	Wearing Apparel:		
	Appropriation		$ 1.00
	Expended		1.00
Code 1539	Office Equipment:		
	Appropriation		$ 50.00
	Expended		0.00
	Balance, December 31, 1934		$ 50.00
Code 1540	General Plant Equipment:		
	Appropriation		$ 1,000.00
	Expended		882.24
	Balance, December 31, 1934		$ 117.76
Code 1541	General Plant Materials:		
	Appropriation		$ 1,000.00
	Expended		983.88
	Balance, December 31, 1934		$ 16.12
Code 1542	Repairs and Replacements:		
	Appropriation		$ 2,580.00
	Expended		2,580.00
Code 1543	Light, Heat and Power:		
	Appropriation	$ 500.00	
	Transf. from Code 1537	92.40	592.40
	Expended		592.40
Code 1544	Telephone Service:		
	Appropriation		$ 500.00
	Expended		452.62
	Balance, December 31, 1934		$ 47.38
Code 1545	Carfare:		
	Appropriation		$ 60.00
	Expended		60.00
Code 1546	Expressage and Deliveries:		
	Appropriation		$ 200.00
	Expended		188.25
	Balance, December 31, 1934		$ 11.75

Code 1547	General Plant Service:	
	Appropriation	$ 400.00
	Expended	400.00
Code 1548	Contingencies:	
	Appropriation	$ 50.00
	Expended	50.00

Summary of Tax Budget Accounts:

Appropriated		
Personal Service		$ 67,820.22
Other Codes		
Original Appropriation	$ 11,746.00	
Supplemental (by transfers)	3,133.03	14,879.03
Total		82,699.25
Expended		82,140.85
Balance, December 31, 1934		$ 558.40

II. Private Funds Accounts

1. *Endowment Fund* ($50,500.00) *Restricted:* *

Income Account:	
Income 1934	$ 2,020.00
Transferred to Special Contributions	2,020.00
	$ 0.00

2. *Life Membership Fund* ($7,000.00) *Restricted:*

Income Account:	
Income 1934	$ 280.00
Transferred to Annual Membership Account	280.00
	$ 0.00

3. *George C. Brackett Library Fund* ($500.00) *Restricted:*

Income Account:	
Income 1934	$ 20.00
Expended	15.98
Balance, December 31, 1934	$ 4.02

4. *Benjamin Stuart Gager Memorial Fund* ($13,417.20) *Restricted:*

Income Account:		
Balance, January 1, 1934	$ 173.95	
Income 1934	536.68	$ 710.63
Expended		660.95
Balance, December 31, 1934		$ 49.68

* Restricted funds are those limited by terms of gift, bequest, or solicitation, to the scientific and educational work of the Garden.

5. *Martha Woodward Stutzer Memorial Fund* ($10,000.00) *Restricted:*

Income Account:		
Balance, January 1, 1934	$ 119.67	
Income 1934	400.00	$ 519.67
Expended		514.56
Balance, December 31, 1934		$ 5.11

6. *Mary Bates Spalding Fund* ($2,697.00) *Restricted:*

Income Account:		
Balance, January 1, 1934	$ 107.42	
Income 1934	107.88	$ 215.30
Expended		153.43
Balance, December 31, 1934		$ 61.87

7. *Alfred T. White Fund* ($243,149.27) *Restricted:*

Income Account:		
Balance, January 1, 1934	$ 2,400.00	
Income 1934	9,725.96	$ 12,125.96
Expended	$ 272.30	
Transferred to Special Contributions	11,625.97	11,898.27
Balance, December 31, 1934		$ 227.69

8. *A. Augustus Healy Bequest* ($9,798.31) *Restricted:*

Income Account:		
Income 1934		$ 391.92
Transferred to Special Contributions		391.92
		$ 0.00

9. *Robert B. Woodward Bequest* ($25,000.00) *Restricted:*

Income Account:		
Income 1934		$ 1,000.00
Transferred to Special Contributions		1,000.00
		$ 0.00

10. *Alfred T. White Memorial Tablet Fund* ($3,889.85) *Restricted:*

Income Account:		
Income 1934		$ 155.56
Transferred to Special Contributions		155.56
		$ 0.00

11. *Brooklyn Institute Centennial Fund B.B.G. Share* ($30,000.00) *Restricted:*

Income Account:		
Income 1934		$ 1,200.00
Transferred to Special Contributions		1,200.00
		$ 0.00

12. *John D. Rockefeller, Jr. Fund* ($250,000.00) *Restricted:*

Income Account:		
Balance, January 1, 1934	$ 1,931.37	
Income 1934	10,000.00	
Transferred from Tuition and Sales	300.00	$ 12,231.37
Expended	$ 1,406.12	
Transferred to Special Purposes:		
(Account 21, g)	48.46	
Transferred to Special Contributions	10,751.04	12,205.62
Balance, December 31, 1934		$ 25.75

13. *Citizens Endowment Fund* ($253,929.26) *Restricted:*

Income Account:		
Income 1934		$ 10,157.15
Transferred to Special Contributions		10,157.15
		$ 0.00

14. *Sustaining Membership. Restricted:*

Balance, January 1, 1934	$ 24.99	
Received from dues	399.85	$ 424.84
Transferred to Annual Membership Account		424.84
		$ 0.00

15. *Annual Membership. Restricted:*

Balance, January 1, 1934	$ 210.31	
Received from dues 1934	5,335.50	
Transferred from Life Membership Account	280.00	
Transferred from Sustaining Membership	424.84	
Miscellaneous Receipts	21.86	$ 6,272.51
Expended	$ 3,218.67	
Transferred to Special Contributions	1,000.00	4,218.67
Balance, December 31, 1934		$ 2,053.84

16. *Tuition and Sales. Restricted:*

Balance, January 1, 1934	$ 1,849.09	
Received 1934		
a. Tuitions	2,101.20	
b. Seed Packets	8,402.40	
c. Sales	440.22	
d. Miscellaneous	283.01	$ 13,075.92
Expended	$ 3,896.57	
Transferred to Special Contributions	5,459.90	
Transferred to J. D. Rockefeller, Jr. Fund	300.00	9,656.47
Balance, December 31, 1934		$ 3,419.45

17. *Botanic Garden Collections Fund. Restricted:*		
Balance, January 1, 1934	$ 289.01	
Received from Contributions	5,807.50	
Miscellaneous	269.89	$ 6,366.40
Expended	$ 3,055.84	
Transferred to Special Contributions	3,300.00	6,355.84
Balance, December 31, 1934		$ 10.56
18. *Cary Library Fund* ($10,000.00—1/5 *of Income to Brooklyn Botanic Garden*) *Restricted:*		
Balance, January 1, 1934	$ 63.70	
Income Allotment 1934	80.00	$ 143.70
Expended		142.90
Balance, December 31, 1934		$ .80
19. *Henry W. Healy Trust Fund* ($231,977.17—1/4 *of Income to Brooklyn Botanic Garden*) *Restricted:*		
Balance, January 1, 1934	$ 0.00	
Income 1934	1,668.00	$ 1,668.00
Transferred to Special Contributions		$ 1,653.00
Balance, December 31, 1934		$ 15.00
20. *Mrs. Henry C. Folger Fund* ($1,000.00) *Restricted:*		
Income Account:		
Balance, January 1, 1934	$ 0.00	
Income 1934	40.00	$ 40.00
Expended		0.00
Balance, December 31, 1934		$ 40.00
21. *Special Purposes. Restricted by Terms of Gifts:*		
Balance, January 1, 1934	$ 1,040.94	
Received:		
a. Special Gifts for Children's Work	301.25	
b. Test Garden, Japanese Iris	4.00	
c. Victory Maples	50.00	
d. Compensation of Landscape Architect: Improvement of Auditorium	1,300.00	
e. Planting North Addition	650.00	
f. Miscellaneous	15.00	
g. Transf. from J. D. Rockefeller, Jr. Fund (for Japanese Garden)	48.46	$ 3,409.65
Expended		1,253.07
Balance, December 31, 1934		$ 2,156.58
22. *Plant Pathology Research Fund. Restricted:*		
Balance, January 1, 1934	$ 478.35	
Income 1934	6,250.00	$ 6,728.35
Expended	$ 492.57	
Transferred to Special Contributions	6,200.00	6,692.57
Balance, December 31, 1934		$ 35.78

23. *Special Contributions (for 1934 only) Restricted:*

Balance, January 1, 1934		$ 1,548.56
Salary Rebate		200.00
Miscellaneous		623.75
Transferred from		
Endowment Fund Income Account	2,020.00	
Alfred T. White Fund Income Account	11,625.97	
A. Augustus Healy Bequest Income Account	391.92	
R. B. Woodward Bequest Income Account	1,000.00	
A. T. White Memorial Tablet Fund Income Account	155.56	
Brooklyn Institute Centennial Fund Income Account	1,200.00	
J. D. Rockefeller, Jr. Fund Income Account	10,751.04	
Citizens Endowment Fund Income Account	10,157.15	
Annual Membership Account	1,000.00	
Tuition and Sales, Public Instruction	459.90	
" " " Elementary Instruction	5,000.00	
Collections Fund	3,300.00	
Henry W. Healy Trust Fund	1,653.00	
Plant Pathology Research Fund	6,200.00	$ 57,286.85
Expended		55,783.87
Balance, December 31, 1934		$ 1,502.98

24. *Endowment Increment Fund* ($130,064.31) *Restricted:*

Interest 1934		$ 5,075.05
Transferred to Principal		5,075.05
		$ 0.00

Summary of Private Funds Accounts:

Balances, January 1, 1934		$ 10,237.36	
Income 1934		75,313.63	$ 85,550.99
Expended		$ 70,866.83	
Transferred to Endowment Increment Fund Principal		5,075.05	75,941.88
Balances, December 31, 1934			$ 9,609.11

NOTE: The book value total of the principal of all Private Funds as of December 31, 1934, is $1,090,939.49.

III. SUMMARY OF TOTAL MAINTENANCE BUDGET FOR 1934

Income

Tax Budget Appropriation, 49.2%	$ 82,699.25	
Private Funds Budget, 50.8%	85,550.99	
Total		$168,250.24
Transferred to Endowment Increment Fund Principal		5,075.05
Available		$163,175.19

Expended		
Personal Service		
Tax Budget	$ 67,820.22	
Private Funds	55,783.87	
Total		$123,604.09
Other than Personal Service		
Tax Budget	$ 14,879.03	
Private Funds	15,082.96	
Total	$ 29,961.99	$153,566.08
Balance, December 31, 1934		$ 9,609.11

Respectfully submitted,

DANIEL C. DOWNS,
Secretary and Accountant.

Note: The above "Financial Statement" is a transcript of Brooklyn Botanic Garden accounts in the books of the Treasurer of the Brooklyn Institute of Arts & Sciences. The Treasurer's accounts are audited annually by a Public Accountant, and a separate audit of this "Financial Statement" is not made in order to save unnecessary expense.

EDWIN P. MAYNARD,
Treasurer.

APPENDIX I

GIFTS RECEIVED DURING 1934

Collections Fund

Mrs. Frank L. Babbott
Edward C. Blum
Mrs. Edward C. Blum
Mrs. Armin E. Brunn
Mrs. Glentworth R. Butler
Mrs. S. Parkes Cadman
Mrs. Walter V. Cranford
Mrs. Mary Childs Draper
Mrs. C. I. De Bevoise
Dugan Brothers
Otto Ebel
Miss Adele F. Emerson
Mrs. William Emerson
Gates D. Fahnestock
Fortnightly Club
A Friend
John W. Frothingham
William T. Hunter
Miss C. Julie M. Husson
Miss Hilda Loines
Mrs. William W. Marshall
Mrs. Edwin P. Maynard
Mrs. Charles F. Noyes
Mrs. Charles E. Perkins
James H. Post
Mrs. James H. Post
Mrs. Frederic B. Pratt
Harold I. Pratt
William A. Putnam
Mrs. William A. Putnam
Mrs. Seth Thayer Stewart
Miss Elise W. Stutzer
Mrs. Mary Van Norden
Mrs. R. C. Weithas
Mrs. Alexander M. White
Miss Frances E. White
Miss Harriet H. White
Peter Piper Wright (A dog)
Miss Abigail Young

Special Gifts for Children's Work

Woman's Auxiliary, B. B. G.	$	266.25
Mrs. Charles E. Perkins		25.00
Parent Teachers Association of P. S. 117		10.00

Beardless Iris Project

Miss Helen Adams Paffard	$	2.00
Miss Eleanor Parry		2.00

Victory Maples

Battle Pass Chapter, N. S. D. A. R.	$	50.00

Landscaping, Auditorium, etc.

Woman's Auxiliary, B. B. G.	$	1,000.00

Planting the North Addition

Woman's Auxiliary, B. B. G.	$	650.00

Miscellaneous

Women of '76 Chapter, N. S. D. A. R.	$	15.00

Library

Books

Black, Hon. Loring M., Jr., Washington, D. C.	1
Brooklyn Botanic Garden Boys' and Girls' Club	12
Brooklyn Plant, Flower and Fruit Guild, Brooklyn, N. Y.	1
Century Association, New York, N. Y.	10
DuVal, Mr. Guy, Brooklyn, N. Y.	1
Fairbanks, Miss M. B., Brooklyn, N. Y.	1
Gager, Dr. C. Stuart, Brooklyn, N. Y.	22
Hecht, Miss Sadie, New York, N. Y.	1
Hottes, Mr. Alfred C., Des Moines, Iowa	2
Lemée, Dr. Albert, Brest, France	1
Levine, Mrs. Dorothy, Brooklyn, N. Y.	1
Massachusetts Agricultural College Library, Amherst, Mass.	1
Minnesota Horticultural Society, St. Paul, Minn.	44
Penna, Señor Leonam de Azeredo, Rio de Janeiro, Brazil	1
Pierpont Morgan Library, New York, N. Y.	1
Shaw, Miss Ellen Eddy, Brooklyn, N. Y.	1
Smalley, Mrs. Arthur, Brooklyn, N. Y.	1
Smithsonian Institution, Washington, D. C.	1
Stoll, Mr. Frank, Brooklyn, N. Y.	1
Sutcliffe, Miss Alys, Brooklyn, N. Y.	1
Total	105

PAMPHLETS

American Antiquarian Society, Worcester, Mass. 1
American Fern Society 54
Ames, Professor Oakes, Cambridge, Mass. 1
Baur, Professor Erwin, Muncheberg, Germany 3
Benedict, Dr. Ralph Curtiss, Brooklyn, N. Y. 2
Bojko, Dr. Hugo, Vienna, Austria 1
Boydston, Mrs. Kathryn E., River Forest, Ill. 1
Braun, Miss E. Lucy, Cincinnati, Ohio 2
Carnegie Institution of Washington, Washington, D. C. 4
Carnegie Institution of Washington, Dept. of Genetics, Cold Spring Harbor, L. I. 29
Cheney, Dr. Ralph Holt, Brooklyn, N. Y. 11
Chichester, Mrs. Emilie P., Brooklyn, N. Y. 1
Cornell University, Dept. of Plant Pathology, Ithaca, N. Y. 23
Dachnowski-Stokes, Dr. A. P., Washington, D. C. 4
Dinsmore, Mr. John Edward, American University of Beirut, Syria 3
Dowd, Mr. Daniel, Norwood, Ohio 1
Edgars, Mr. Norman K., Tenafly, N. J. 1
Eidlitz, Mrs. Ernest Frederick, New York, N. Y. 1
Erlanson, Miss Eileen Whitehead, London, England 1
Evans, Mr. Herbert M., Berkeley, Cal. 1
Fosberg, Mr. F. Raymond, Honolulu, Hawaii 3
Free, Mr. Montague, Brooklyn, N. Y. 6
Gager, Dr. C. Stuart, Brooklyn, N. Y. 121
Goldring, Miss Winifred, Albany, N. Y. 2
Hansel, Mrs. Dorothy Ebel, New York, N. Y. 1
Helbrun, Miss Margaret, Cambridge, Mass. 1
Hitchcock, Dr. A. S., Washington, D. C. 1
Institut Botanique Agricole et Colonial de Nancy, France 1
LePrince, Miss G. Marie, New York, N. Y. 1
Linnean Society of London, London, England 1
Lloyd, Professor Francis E., Montreal, P. Q. 5
Loines, Miss Hilda, Brooklyn, N. Y. 1
Long Island Chamber of Commerce, New York, N. Y. 1
Looser, Mr. Gualterio, Santiago, Chile 1
Maheshwari, Dr. P., Agra, India 2
Medical Society of the County of Kings, Brooklyn, N. Y. 2
Meller, Professor H. B., Pittsburgh, Pa. 7
New York State Museum, Albany, N. Y. 1
Pennsylvania, University of, Zoological Laboratory, Philadelphia 2
Robinson, Professor B. L., Cambridge, Mass. 1
Rockefeller Institute for Medical Research, New York, N. Y. 17
Rohde, Miss Eleanour Sinclair, London, England 1
Ross, Dr. William H., Brentwood, L. I. 2
Rübel, Dr. Eduard, Zürich, Switzerland 1

Saunders, Miss Edith R., Cambridge, England 4
Savulescu, Dr. Tr., Bucuresti, Roumania 9
Seward, Professor A. C., Cambridge, England 1
Shreve, Dr. Forrest, Tucson, Ariz. 1
Smith, Dr. Hay Watson, Little Rock, Ark. 2
Spingarn, Mr. J. E., Amenia, N. Y. 2
Struckmann, Mr. Erick, Copenhagen, Denmark 2
Svenson, Dr. Henry K., Brooklyn, N. Y. 1
Tilden, Dr. Josephine E., Minneapolis, Minn. 8
Utter, Mr. Gordon, Brooklyn, N. Y. 2
van Melle, Mr. P. J., Poughkeepsie, N. Y. 1
Went, Dr. Johanna C., Wassenaar, Holland 1
Woodleton, Mrs. Helen S., Brooklyn, N. Y. 5
Zillig, Dr. Hermann, Berncastel-Cues/Mosel, Germany 13
Total 379

Parts of Publications

(Exclusive of Government Documents)

American Fern Society 62
American Horticultural Society, Washington, D. C. 4
American Scenic and Historic Preservation Society, New York, N. Y. . . . 1
American Sugar Refining Company, New York, N. Y. 1
American Tree Association, Washington, D. C. 1
Ames, Professor Oakes, Cambridge, Mass. 11
Basic Science Research Laboratory, Cincinnati, O. 1
Behning, Dr. A. L., Aralsk, U. S. S. R. 6
Benedict, Dr. Ralph Curtiss, Brooklyn, N. Y. 1
British Honduras. Conservator of Forests, Belize 1
Cambridge, University of. Botanic Garden Syndicate, Cambridge, England 1
Carnegie Institution of Washington, Washington, D. C. 1
Carnegie Institution of Washington, Dept. of Genetics, Cold Spring Harbor, L. I. 2
Cattell, Professor J. McKeen, New York, N. Y. 2
Colorado, University of, Boulder, Col. 2
Eastwood, Miss Alice, San Francisco, Cal. 1
Eidlitz, Mrs. Ernest Frederick, New York, N. Y. 1
Fisher Scientific Company, Pittsburgh, Pa. 3
Florida Entomological Society, Gainesville, Fla. 3
Flushing Garden Club, Inc., Flushing, L. I. 1
Free, Mr. Montague, Brooklyn, N. Y. 10
Gager, Dr. C. Stuart, Brooklyn, N. Y. 33
General Biological Supply House, Chicago, Ill. 12
Genetics Society of America 1
Giardino Botanical Alpino dell' Ordine Mauriziano, Turin, Italy 1

Graves, Dr. Arthur Harmount, Brooklyn, N. Y.	1
Hawaii, University of, Honolulu, Hawaii	1
Idaho, University of, School of Forestry, Moscow, Idaho	1
Imperial Bureau of Plant Genetics, Aberystswith, Wales	2
Jenkins, Mr. Charles F., Germantown, Pa.	3
McFarland Organizations, Harrisburg, Pa.	1
Medical Society of the County of Kings, Brooklyn, N. Y.	13
Meguro Forestry Experimental Station, Tokyo, Japan	1
Michigan, University of, School of Forestry and Conservation, Ann Arbor, Mich.	2
Missouri State Museum, Jefferson City, Mo.	3
Nanking University, College of Agriculture and Forestry, Nanking, China	9
National Research Council, Ottawa, Canada	2
National Research Council, Washington, D. C.	1
National Research Council of Japan, Tokyo, Japan	2
New Jersey Horticultural Society, New Brunswick, N. J.	6
New York Public Library	6
Ohara Institute for Agricultural Research, Kurashiki, Japan	1
Pyle, Mr. Robert, West Grove, Pa.	1
Ramaley, Dr. Francis, Boulder, Col.	1
Reed, Dr. George M., Brooklyn, N. Y.	48
Rockefeller Institute for Medical Research, New York, N. Y.	2
Roosevelt Wild Life Forest Experiment Station, Syracuse, N. Y.	2
School Garden Association, New York, N. Y.	6
Smithsonian Institution, Washington, D. C.	2
Sociedad Española de Historia Natural, Madrid, Spain	12
Southern Methodist University, Dallas, Texas	2
Stanford University, Cal.	2
Struckmann, Mr. Erick, Copenhagen, Denmark	1
Taber, Mrs. D. Sherman, Flushing, L. I.	36
Taihoku Imperial University, Formosa, Japan	1
Tohoku Imperial University, Sendai, Japan	4
Towson Nurseries, Towson, Md.	2
Utter, Mr. Gordon, Brooklyn, N. Y.	2
West Virginia Academy of Science, Morgantown, W. Va.	1
Wild Flower Preservation Society, Inc., Washington, D. C.	5
Woodleton, Mrs. Helen S., Brooklyn, N. Y.	22
Yale University, School of Forestry, New Haven, Conn.	5
Total	375

Portraits and Photographs

Bessey, Professor Ernst A., East Lansing, Mich.	1
Burgess, Mrs. Edward Sanford, Yonkers, N. Y.	1
Edinburgh, Royal Botanic Garden, Scotland (Print: View of Edinburgh).	1
Free, Mr. Montague, Brooklyn, N. Y.	1
Gundersen, Dr. Alfred, Brooklyn, N. Y.	3

Council of the Linnean Society of London, England	1
Town Council of Montrose, Forfarshire, Scotland	2
Novani, Mr. Giulio, New York, N. Y.	1
Phillips, Dr. E. Percy, Praetoria, South Africa	1
Plonski, Mr. W. D., New York, N. Y.	3
Schmitz, Mr. Carl L., New York, N. Y.	4
Shull, Dr. George H., Princeton, N. J.	1
Zahlbruckner, Dr. A., Vienna, Austria	1
Total	21

AUTOGRAPH LETTERS

Gager, Dr. C. Stuart, Brooklyn, N. Y.	20
Lyell, Baron and Hon. Lady Langman, London, England	1
Total	21

MISCELLANEOUS

Chichester, Mrs. Emilie P., Brooklyn, N. Y. 1 Map of Asia.

New York State Library, Albany, N. Y. 1 Geological Map of New York State.

Socony Touring Service, New York, N. Y. 6 Maps (New York, New Jersey, New England, etc.).

Yamanaka & Company, New York, N. Y. 1 Diagram of Japanese Flower Arrangement.

Living Plants

Agnew, Miss E. T., Montauk, L. I., 3 *Arctostaphylos Uva-ursi*, 4 *Cypripedium acaule*, 8 *Hieracium venosum*, 1 *Hudsonia tomentosa*, 1 *Linaria canadensis*.

Andorra Nurseries, Inc., Chestnut Hill, Philadelphia, 100 scions of *Acer platanoides* var. *palmatifidum*.

Becker, Mr. Herman, Brooklyn, N. Y., 113 plants comprising 87 varieties of cacti, *Stapeliads* and succulents.

Burpee, W. Atlee Co., Philadelphia, 12 cuttings of *Nasturtium*.

Conard Pyle Co., West Grove, Pa., 9 roses in 5 varieties.

Elwert, Mr. Max., Red Hook, N. Y., 50 seedlings of *Lobelia cardinalis*.

Fener, Mrs., Brooklyn, 2 *Sarracenia purpurea*.

Gerber, Mr. Charles N., Brooklyn, 1 plant Winesap Apple.

Haartz, Mr. John C., Compton, N. H., 2 bulbs of *Ornithogalum aureum*.

Heath, Mr. Royal V., New York, 1 *Euphorbia natalensis*.

Hecht, Miss Sadie, New York, 5 plants from Texas, comprising 3 species.

Henry, Mrs. J. Norman, Gladwyne, Pa., 50 seedlings of *Stapelia cantabrigiensis*.

Jackson & Perkins Co., Newark, New York, 68 roses in 14 varieties.

Kerr, Mrs. Ellen Van Norden, Spring Valley, N. Y., 1 *Crassula Schmidtii*.

Kovac's Nursery, Purchase, N. Y., 4 rose varieties.

Lemmon, Mr. Robert S., New York, 1 *Polystichum Lemmoni*.

Long, Mrs. Walter P., Brooklyn, 21 plants in 6 species.

Macrum, Mr. E. K., Brooklyn, 1 seedling of *Araucaria imbricata*.

McKee, Mr. Frank, Brooklyn, 1 *Rhododendron.*
Michal, Mr. A., West Orange, N. J., 1 *Globularia trichosantha.*
New York State, Federated Garden Clubs of, 139 plants comprising 131 species of *Sedum* and *Sempervivum.*
Perkins, Mrs. Charles E., Brooklyn, 1 *Cypripedium hirsutum*, 1 *Orchis spectabilis.*
Regan, Mrs. W. J., Butte, Montana, 33 species of rock garden plants.
Rodman, Mr. F. C., Brooklyn, 930 tubers and bulbs, comprising 11 species of *Anemone, Crocus, Narcissus*, etc.
Schwartau, Mrs. Leonard, Brooklyn, 1 *Galax aphylla.*
Seymour, Mr. C. Lansing, Proctor, Vermont, 28 species of Sedum.
Swedroe, Mr. Paul, New York, 6 *Begonia* species.
Tricker, William, Inc., Saddle River, N. J., 38 species of tropical water lilies.
Tuthill, Miss I. H., Brooklyn, 1 *Chrysanthemum* "Garza," 6 double sweet *Viola.*
Whiting, Mrs. F. L., Chatham, N. J., 12 *Opuntia vulgaris.*
Whitney, Mrs. Elsie G., Albany, N. Y., 5 species of ferns.

Seeds

American Amaryllis Society (1)
Mrs. Florence H. Barber (1)
Mrs. Harold D. Barstow (1)
Mr. Herman Becker (10)
Miss Mary Bell (17)
Mr. A. G. Bergner (1)
Mr. A. Barnhardt (1)
Dr. Leon Croizat (1)
Great Southern Lumber Company (1)
Mrs. William Hand (2)
Miss Sadie Hecht (1)
Dr. C. T. Hilton (1)
Mr. F. G. Knowlton (1)
Miss Hilda Loines (5)
Mr. George W. Park (19)
Miss M. Helen Smith (1)
Mrs. D. Shearman Taber (1)
Dr. C. H. Townsend (1)

Phanerogamic Herbarium

Collin, Mrs. Louise Merritt, 1200 specimens from the United States and Canada.
Drushel, Dr. J. A., 128 specimens from the United States.
Elwert, Mr. Max A., 1 *Gerardia tenuifolia* var. *alba.*
Fitzpatrick, Mrs. M. J., 1 *Margyricarpus setosus.*
Hanmer, Mr. Charles C., 735 specimens from Fishers Island and Nova Scotia.
Kittredge, Miss E. M., 6 specimens from Vermont.
St. John, Mr. R. P., 18 specimens of ferns from Florida.
Svenson, Dr. H. K., 3 specimens from New England.

Cryptogamic Herbarium

Dr. Robert Hagelstein, Mineola, N. Y., 115 specimens of Myxomycetes.

Miscellaneous

Ford, Dr. E. S., 1 photograph of *Botrychium virginianum*.

For the Department of Elementary Instruction

Boys' and Girls' Club, Twelve books for the children's clubroom library.
Brooklyn Section, New York Public School Kindergarten Association, $10.00 for the work of the Department.
Brunswick, Master Sanford, $1.00 for the children's clubroom library.
Butler, Mrs. Glentworth R., One globe for the children's clubroom. One prize cup competed for by the girls in the outdoor garden.
Gager, Dr. C. Stuart, One book for the children's clubroom library.
Goodman, Mr. and Mrs. Joseph, One cup competed for by the boys in the outdoor garden.
Hecht, Miss Sadie, One book for the children's clubroom library.
Hottes, Mr. Alfred C., Two publications for the children's garden house.
Individual Drinking Cup Company, One set of the "Dixie Nature Series" (pictures) for use in classwork.
Kirk, Miss Isabel, Fifty seedlings of spider plant and Ampelopsis.
Levine, Mrs. Joseph, One book for the children's garden house.
Miner, Miss Frances M., One flower bowl for the children's garden house.
Perkins, Mrs. Charles E., $25.00 honorarium for children's garden work.
Phillips, Dr. E. Percy, One book for the children's clubroom library.
Public School 117, Queens, Parent-Teachers Association, $10.00 for the children's work.
Public School 225 Mothers' Club, One flower bowl for the children's clubroom.
Shaw, Miss Ellen Eddy, One book for the children's clubroom library. Four gold honor pins for service in the outdoor garden. One pewter cup as award for children's work.
Smalley, Mrs. Arthur, One book for the children's garden house.
Stern, Mr. Herman, One motion picture reel of work in the children's garden.
Stoll, Mr. Frank, One book for the children's clubroom library.
Sutcliffe, Miss Alys, One book for the children's clubroom library.
United States National Museum, One set of minerals for use in classwork.

Miscellaneous

Brooklyn Flower Show, Inc., 100 Cedar trees suitable for poles.
Mrs. George Stewart Brown, Brooklyn, 1 fossil of Lepidodendron.
Mrs. Glentworth R. Butler, Brooklyn, 29 specimens of wood of different trees.
Dr. M. Davidson and Dr. L. Landau, Kingston Avenue Hospital, Brooklyn, 7 stained slides of pathogenic bacteria.
Mrs. Ernest F. Eidlitz, New York City, 1 photograph of Japanese Day in Flower Arrangement Course, 1934.
Mrs. Clarence R. Hyde, Brooklyn, 1 steps-stand for seed exhibit.
Mr. Marcel le Piniec, Bergenfield, N. J., 15 tons of weathered granite.

Miss G. Marie Le Prince, New York City, 1 hanging vase of Inwood pottery.
Mr. Giulio Novani, New York City, 1 photograph of night-blooming Cereus.
Mrs. William Sterling Peters, Brooklyn, 1 vase and 1 bronze flower container.
Royal Botanic Garden, Edinburgh, Scotland, print of Old Physic Garden, Edinburgh.
Mr. Preston King Sheldon, Flushing, N. Y., 5 photographs of Flushing Cedar of Lebanon.
Miss Jacqueline Smith, Brooklyn, 60 70 "Swordfin" Guppies, with a quantity of various aquatic plants and 2 cans of fish food.
Mr. George Warren Stetson, Boston, Mass., 6 photographic prints.
Mr. E. Vermilya, Brooklyn, 2 Paradise fish.
Mrs. Elsie Gibson Whitney, Albany, N. Y., 2 lantern slides of *Asplenium Ruta-muraria*.

APPENDIX 2

PUBLICATIONS BY THE BOTANIC GARDEN PERSONNEL DURING 1934

Becker, Herman.

The Brooklyn Botanic Garden's Succulent Display. *Cactus and Succulent Journ.* **6:** 44–45. September.

Review: Zander, Robert. Grosses Garten-Lexikon, Reichillustrierter Ratgeber für Gartner und Gartenfreunde. *Florists Exchange* **82:** 12. June 23.

Benedict, Ralph C.

Review: Ching, R. C. The studies of Chinese ferns, VIII. (Sinensia 3: 131–156. November, 1932.) *Amer. Fern Jour.* **24:** 17. January-March.

Review: Ching, R. C. The studies of Chinese ferns, IX. (Bull. Fan Memorial Institute of Biology 4: 47–116. February, 1933.) *Amer. Fern Jour.* **24:** 17–18. January–March.

Review: Ching, R. C. The present status of our knowledge of Chinese ferns. (Peking Natural History Bull. 33: 253–273. 1932.) *Amer. Fern Jour.* **24:** 18. January–March.

Review: Tatewaki, M. The phytogeography of the Middle Kuriles. (Jour. Facul. Agr., Hokkaido Imperial University. Vol. 29, Pt. 5, 1933.) *Amer. Fern Jour.* **24:** 18. January–March.

Review: Small, John K. Native ferns in the New York Botanical Garden. (Jour. N. Y. Bot. Gard. 35: 148–151. 1934.) *Amer. Fern Jour.* **24:** 114–115. October–December.

Review: Small, John K. Ferns within one hundred miles of New York City. (Jour. N. Y. Bot. Gard. 35: 197–207. 1934.) *Amer. Fern Jour.* **24:** 114–115. October–December.

Can anyone readily distinguish the northern and southern lady fern species? *Amer. Fern Jour.* **24:** 117–119. October–December.

Advice on preparation for high school biology teaching examination. A letter to Mr. Edgar Zwilling, Pres., Biology Alumni of Brooklyn College. *Biology Alumni of Brooklyn College Bull. No. 1.* December 27.

Cheney, Ralph H.

Relation of Caffeine and Coffee to Human Efficiency. *Jour. Amer. Pharm. Assoc.*, **23:** 143. February.

A Simplified Psychodometer. *Jour. Lab. and Clin. Med.* **19:** 1238. August.

Free, Montague

Pruning ornamental trees and shrubs. *Brooklyn Bot. Gard. Leaflets* **XXII**[3–4]. March 21.

The exhibits of the Brooklyn Botanic Garden at the Twenty-first International Flower Show, March 19–24. *Brooklyn Bot. Gard. Leaflets* **XXII**[5]. March 21.

Report of the Horticulturist and Head Gardener for 1933. *Brooklyn Bot. Gard. Record* **23:** 87–94. April.

The planting and cultivation of annuals. *Brooklyn Bot. Gard. Leaflets* **XXII**[6]. April 25.

Crocus speciosus. *Gardeners' Chronicle of America* **38:** 154. May.

Starting perennials from seed. *Brooklyn Bot. Gard. Leaflets* **XXII**[7]. May 9.

The rock garden in May. *New York Sun.* May. 12.

Westchester declared rock gardeners' paradise. Flower Show Section of nine *Westchester daily newspapers.* Westchester County Publishers, Inc., Yonkers. June.

The president's address. American Rock Garden Society. *Gardeners' Chronicle of America* **38:** 184. June.

The sandworts. *Gardeners' Chronicle of America* **38:** 216. July.

Anemones. *Gardeners' Chronicle of America* **38:** 218. July.

What garden clubs can do to educate the public. *Garden Club Exchange.* Meredith Publishing Co., Des Moines, Iowa. August.

Rock and wall gardens. *Booklet* published by McCall's Magazine. August.

Small rock gardens gain in beauty. *New York Times.* August 5.

Wild tulips for your garden. *New York Sun.* August 11.

"Lesser" bulbs for variety. *New York Sun.* September 1.

Wild tulips for your garden. *Garden Digest* **6:** 8–10. October. Repr. *New York Sun,* Aug. 11.

The care of house plants. *Brooklyn Bot. Garden Leaflets* **XXII**[8–9]. October 24.

Repotting and dividing house plants. *Gardeners' Chronicle of America* **38:** 356. December. Repr. *Brooklyn Bot. Gard. Leaflets* **XXII**[8–9]. Oct. 24.

Gager, C. Stuart

Annual report of the Brooklyn Botanic Garden: Report of the Director. *Brooklyn Bot. Gard. Record* **23:** 13–170. April.

Adaptations in the plant world. *The Great Design.* Chapter 7, pages 161–185. London. Duckworth. May.

Graves, Arthur Harmount

Forest pathology. (Annual Report.) Chestnut breeding work in 1933. *Brooklyn Bot. Gard. Record* **23:** 67–75. April.

Report of the Curator of Public Instruction for 1933. *Brooklyn Bot. Gard. Record* **23:** 94–102. April.

Report on winter injury to the woody plants in the Brooklyn Botanic Garden. *Brooklyn Bot. Gard. Record* **23:** 171–209. July.

Autumn coloration. *Brooklyn Bot. Gard. Leaflets* **22**[8–9]. October.

50 newspaper articles relating to the Brooklyn Botanic Garden.

16 abstracts in *Biological Abstracts.*

Graves, Arthur Harmount and Alfred Gundersen

The collection of living cycads at the Brooklyn Botanic Garden. *Brooklyn Bot. Gard. Leaflets* **22**[1–2]. February.

Gundersen, Alfred

Report of the Curator of Plants for 1933. *Brooklyn Bot. Gard. Record* **23:** 75–80. April.

Gundersen, Alfred and Arthur Harmount Graves

The Collection of Living Cycads at the Brooklyn Botanic Garden. *Brooklyn Bot. Gard. Leaflets* **22**[1–2]. February.

Reed, George M.

Plant Pathology. *Brooklyn Bot. Gard. Record* **23:** 54–63. April.

Inheritance of resistance to loose and covered smut in hybrids of Black Mesdag with Hull-less, Silvermine, and Early Champion oats. *Amer. Jour. Bot.* **21:** 278–291. May.

The iris of Japan. *Flower Grower* **21:** 290, 291. July.

Inheritance of resistance to loose smut and covered smut in some oat hybrids. *Jour. Agr. Res.* **48:** 1073–1083. June.

(Cooperative investigations with the Division of Cereal Crops & Diseases, U. S. D. A. **T. R. Stanton, George M. Reed, and F. A. Coffman**).

Shaw, Ellen Eddy

The joys of a seed catalogue. *McCall's Magazine.* February.

The museum, an integral part of the science program. *Journal of the American Nature Study Society* **1:** 4. April.

Report of the Curator of Elementary Instruction. *Brooklyn Bot. Gard. Record* **23:** 103–110.

Garden land. *News Notes* of the National Council of Supervisors of Elementary Science **1:** 5. May.

Vacation fun for boys and girls. *The Sun.* July 3.

Plants for classrooms. *Bulletin No. 2 of The School Nature League.* October.

The following 39 articles appeared in *The Sun* (New York) on the dates indicated:

The seed catalogue. February 3.

Novelties among the annuals. February 10.

Novelties among the perennials. February 17.
Starting perennial seed. February 24.
The lawn. March 3.
The lawn. March 10.
Roses for the small garden. March 17.
Starting annuals indoors. March 24.
Novelties among the roses for 1934. March 31.
The foolproof vegetable garden. April 7.
Annuals for the small garden. April 14.
The good old dahlia. April 21.
The interesting and unusual among the flowers. April 28.
What to plant in early May. May 5.
Color in the garden. May 12.
Late planting and more of it. May 19.
What to do with the house plants. May 26.
Distinction among the shrubs. June 2.
Distinction among the trees. June 9.
Distinction among the vines. June 16.
A look-see in the garden. June 23.
Our climbing roses—their future treatment. June 30.
Trouble in the garden. July 7.
Check-up on progress in the garden. July 14.
Are my plants doing well? If not, why not? July 21.
Order your evergreens now. July 28.
Perennials for next year. August 4.
The lawn again. August 11.
Bulbs to order for spring beauty. August 18.
The glass indoor garden: what to bring back for it. August 25.
Preparing for winter bloom. September 1.
The outdoor bulb bed. September 8.
Our friends, the trees. September 15.
The planting of shrubs for spring bloom. September 22.
Buying bulbs for indoor culture. September 29.
Fall planting of roses and perennials. October 6.
Hints and helps on fall propagation of plants. October 13.
Protection of plants against winter storms. October 20.
How to prevent trouble for the house plants. October 27.

Svenson, Henry K.

List of Seeds Offered in Exchange. *Brooklyn Bot. Gard. Record* **23:** 1–11. January.

Report of the Associate Curator of Plants for 1933. *Brooklyn Bot. Gard. Record* **23:** 80–86. April.

Monographic Studies in Eleocharis—III. Rhodora **36:** 377–389, 2 pl. 1934. *Brooklyn Bot. Gard. Contributions*, No. 68. November.

APPENDIX 3

TALKS, LECTURES, ADDRESSES, AND PAPERS GIVEN BY THE BOTANIC GARDEN PERSONNEL DURING 1934

By the Director:

June 7. *The activities of the Brooklyn Botanic Garden.* Conference of Regents of Greater New York and Long Island Chapters, N. S. D. A. R. At the Garden.

October 9. *Brooklyn Botanic Garden and the Radio Garden Club of New Jersey.* Radio Garden Club Meeting. New Brunswick, N. J.

By the Curator of Public Instruction:

March 2. *Making a new chestnut tree.* Biology Club, Abraham Lincoln High School.

July 31. *The work of the Brooklyn Botanic Garden.* Omnibus College. At the Garden.

August 1. *The work of the Brooklyn Botanic Garden.* Class in education from N. Y. University. At the Garden.

August 15. *Hybridizing the American chestnut.* Girl Scouts of Wallingford. At the trial grounds. Hamden, Conn.

August 22. *The use of wood as fuel, and the relative fuel value of various native tree species.* Girl Scouts of Wallingford. Girl Scout Camp. Wallingford, Conn.

September 20. *Trees and shrubs.* Millbrook Garden Club. Red Hook, N. Y.

By the Curator of Elementary Instruction:

January 25. *Graduation address.* P. S. 119.

January 27. *Nature study for boys and girls.* Pupils of private schools, and parents. At the Garden.

January 31. *Children's work at the Brooklyn Botanic Garden.* Midwinter Institute, St. Marks Methodist Episcopal Church, Brooklyn.

February 15. *Nature study—living not dead.* Union County (N. J.) Chapter, American Nature Study Society, Roselle Park, N. J.

February 21. *Children and nature study.* Mothers' Club, P. S. 117, Queens.

March 7. *Gardens for boys and girls.* P. S. 189.

March 12. *What the Brooklyn Botanic Garden offers to elementary schools.* Principals of School Districts 26 and 28, Brooklyn, Board of Education Building.

March 13. *Planning and maintenance of the small grounds.* Bellerose Woman's Club, Bellerose, Long Island.

March 16. *Prepare for your garden.* Garden Group of International Vital Interests, Inc., New York, N. Y.

March 21. *Children's garden work at the Brooklyn Botanic Garden.* School Garden Association, American Museum of Natural History, New York, N. Y.

March 29. *Gardens for boys and girls.* P. S. 135.

April 4. *Educational work of the Brooklyn Botanic Garden.* Women of the School of Education, New York University. At the Washington Square College.

April 12. *Activities of the Brooklyn Botanic Garden.* Men's Club, Tompkins Avenue Congregational Church, Brooklyn.

April 14. *Nature study not in books.* Westchester County Teachers Association, White Plains, New York.

April 18. *Gardens for boys and girls.* P. S. 155, Queens.

April 19. *The Brooklyn Botanic Garden and its activities.* Mother's Club, P. S. 9. At the Garden.

April 20. *The children's activities at the Brooklyn Botanic Garden.* Fortnightly Library Club. At the Garden.

April 27. *Arbor Day.* Newtown High School.

May 14. *Children's activities at the Brooklyn Botanic Garden.* Mothers' Club, P. S. 117, Queens. At the Garden.

May 16. *Address of welcome to the Brooklyn Botanic Garden.* Heads of Department Association. At the Garden.

May 21. *Children's work at the Brooklyn Botanic Garden.* Brooklyn Plant, Flower and Fruit Guild, Brooklyn.

May 22. *Address of welcome.* Brooklyn Section, New York Public School Kindergarten Association. At the Garden.

May 23. *The educational value of children's gardening.* Staten Island Garden Club, Dongan Hills, Staten Island.

May 24. *Activities of the Brooklyn Botanic Garden.* Mothers' Club, P. S. 225. At the Garden.

June 20. *Educational work of the Brooklyn Botanic Garden.* Faculty of P. S. 186. At the Garden.

June 21. *Class Day address.* P. S. 13.

June 22. *Graduation address.* P. S. 9.

June 26. *Graduation address.* P. S. 169.

September 20. *Gardens for all.* Lily of the Valley Guild, Gerrittsen Beach, Brooklyn.

September 20. *Bulb culture.* South Side Garden Club, Islip, Long Island.

September 21. *Garden exhibits.* Woman's Club of Queens Village, Long Island.

October 5. *Gardens for boys and girls.* Cedarhurst School No. 5, Cedarhurst, Long Island.

October 16. *Children's work at the Brooklyn Botanic Garden.* Dorcas Society, Immanuel Methodist Episcopal Church, Brooklyn.

October 16. *Little gardens for kindergarten rooms.* Brooklyn Section, New York Public School Kindergarten Association. At the Garden.

October 22. *What Federated Garden Clubs may do in the field of work for boys and girls.* Presidents' Council, Federated Garden Clubs of New York State. At Hotel Roosevelt, New York, N. Y.

October 26. *How Nature Curators can start garden clubs.* School Garden Association of New York, Hall of the Board of Education, New York, N. Y.

October 31. *Plants for the classroom.* American Museum of Natural History, New York, N. Y.

November 1. *Planning a garden for the small grounds.* Lily of the Valley Guild, Gerrittsen Beach, Brooklyn.

November 21. *House plants.* Lily of the Valley Guild. At the Garden.

November 23. *Garden work for boys and girls.* Woodmere Academy. Woodmere, Long Island.

December 12. *Soils.* Department of Botany, Brooklyn Institute of Arts and Sciences. At the Garden.

December 20. *Christmas fables and Christmas customs.* Two assemblies, P. S. 233.

By the Curator of Plant Pathology:

February 26. *Iris of Japan.* Monday Afternoon Club of Plainfield, N. J.

May 5. *Japanese gardens.* Reconciliation Trips. At the Garden.

May 9. *Gardens in Japan.* Japanese Woman's Club of New York. At the Garden.

May 10. *Iris.* Germantown Garden Club, Germantown, N. Y.

May 15. *Gardens in Japan.* Winter's Night Club. At the Garden.

July 28. *Japanese gardens.* Reconciliation Trips. At the Garden.

July 31. *Plant breeding.* Class from New York University. At the Garden.

October 19. *Japanese gardens.* Reconciliation Trips. At the Garden.

October 27. *Japanese gardens.* Reconciliation Trips. At the Garden.

November 17. *Japanese gardens.* Reconciliation Trips. At the Garden.

December 13. *Insect pests and plant diseases.* Matinecock Garden Club, Glen Cove, L. I.

By the Curator of Plants:

April 27. *Ornamental Shrubs.* Abraham Lincoln High School, Biology Department.

By the Associate Curator of Plants:

February 15. Ferns and flowering plants of the New York region. Brooklyn Nature Club. At the Children's Museum.

February 20. Native berries. Queens County Bird Club. Flushing, L. I.

November 14. Native plant gardens. Brooklyn Institute, Dept. of Botany. At the Garden.

By the Horticulturist:

January 8. *Plant propagation.* East Orange Garden Club.

January 17. *House plants.* Horticultural Society of New York.

January 24. *Making a well-balanced schedule.* Course in flower show judging, Federated Garden Clubs of New Jersey. Orange, N. J.

April 2. *English gardens.* Sun Dial Garden Club, Hillside, N. J.

April 5. *Rock gardens and rock garden plants.* Garden Institute in connection with Co-operative Extension Work in Agriculture and Home Economics of the State of New Jersey. Hackensack.

April 14. *Fern growing in the home.* American Fern Society. At the Garden.

May 22. *Styles in rock gardens.* Rock Garden Day. At the Garden.

June 12. *The roses and the winter.* Rose Garden Day. At the Garden.

June 26. *Plant propagation.* Garden Club of Easthampton, L. I.

September 25. *Trees and shrubs.* Ridgefield (Conn.) Garden Club.

September 27. *House plants.* Litchfield (Conn.) Garden Club.

October 4. *Pruning.* Englewood (N. J.) Garden Club.

October 22. *Shrubs.* Round table discussion. Federated Garden Clubs of New York State. Hotel Roosevelt, New York City.

October 23. *Bulbs.* Long Island Horticultural Society, at Farmingdale.

December 11. *House plants.* Gardening course. New York Herald-Tribune.

By Instructors:

Miss Dorward:

April 9. *The Brooklyn Botanic Garden.* Mothers' Club, Bedford Academy. At the Garden.

Miss Jenkins:

February 8. *Annuals.* Garden Department of the Woman's Club, Tenafly, N. J.

February 9. *Planning and budgeting the small garden.* Garden Department of the Catholic Women's Club of Westchester County, New Rochelle, N. Y.

February 15. *Starting the small garden.* Mothers' Club, P. S. 100, Queens.

March 9. *Annuals in the garden.* Garden Department of the Woman's Club of Scarsdale.

March 16. *Annuals in the garden.* Garden Club, Essex Fells, N. J.

March 21. *Annuals in the garden.* Spade and Trowel Club, Plainfield, N. J.

April 14. *Planning and budgeting the small garden.* Philippse Manor Garden Club, Tarrytown, N. Y.

April 11. *Little gardens for little children.* Mothers' Club, P. S. 134.

April 20. *Flower arrangement.* Garden Club of Elizabeth, N. J.

April 24. *Flower arrangement.* Western Electric Company, Kearny, N. J.

April 27. *The perennial border.* Garden Department, Woman's Club of Queens Village.

Miss Miner:

February 16. *Children's gardens.* Garden Club of Cornwall, N. Y.

By the Resident Investigator (Economic Plants):

April 14. *Beverages: Plant sources and uses.* (Public Saturday Lecture Series) New York Botanical Garden.

By the Resident Investigator (Ferns):

December 5. *Ferns.* Biology Club of Brooklyn College.

By the Custodian:

June 7. *Plant Conservation.* Brooklyn Boy Scout Nature Club. Children's Museum, Brooklyn.

APPENDIX 4

RADIO TALKS BY THE BOTANIC GARDEN PERSONNEL DURING 1934

By the Horticulturist:

*From Station WOR**

January 12. Garden books.
February 9. Garden books.
April 16. American Rock Garden Society. Under auspices of Federated Garden Clubs of New Jersey.
April 23. Garnering plants for the rockery.
May 25. Random garden thoughts.
June 7. Roses and their history.
July 27. The story of the dahlia.
August 27. The gardener takes a vacation.
September 10. The story of the chrysanthemum.
October 29. The story of the tulip.
November 26. Berries and shrubs as decorative material.
December 24. Christmas plant folk lore.

From Station WNYC

February 22. Preparing for the spring garden.
April 19. April in your garden.
May 17. May in your garden.
July 26. Seeds.
December 13. Christmas plant folk lore.

By the Curator of Public Instruction:

From Station WNYC:

January 4. Research at the Brooklyn Botanic Garden and the Dutch Elm Disease.
January 25. Interesting plants at the Brooklyn Botanic Garden.

* Radio Garden Club addresses given in co-operation with the Co-operative Extension Work in Agriculture and Home Economics of the New Jersey College of Agriculture.

February 1. The cycads at the Brooklyn Botanic Garden.
February 15. Plants in the conservatories of the Brooklyn Botanic Garden.
March 1. Plants in the conservatories of the Brooklyn Botanic Garden.
March 15. The Brooklyn Botanic Garden exhibit at The International Flower Show.
March 29. Signs of spring.
April 12. Spring flowers at the Brooklyn Botanic Garden.
April 26. What to see at the Brooklyn Botanic Garden.
May 10. What to see at the Brooklyn Botanic Garden.
May 24. The Japanese Garden at the Brooklyn Botanic Garden.
June 7. The Rose Garden of the Brooklyn Botanic Garden.
October 4. The educational program at the Brooklyn Botanic Garden.
November 15. What to see at the Brooklyn Botanic Garden.

By the Curator of Elementary Instruction:

From Station WNYC:

January 11. What to do with your Christmas plants.
January 18. Hints and helps to gardeners.
February 8. Starting perennial seed for the outdoor garden.
March 8. Starting seeds of annuals for the outdoor garden.
April 5. New annuals for your garden.
May 3. Planning the flower garden.
May 31. Bedding plants.
September 27. The bulb garden.
November 1. Indoor culture of bulbs.
December 27. Care of Christmas plants.

From Station WOR:

In cooperation with New Jersey College of Agriculture.
January 26. Gardening for your boy and girl.
April 6. Gardens for young folks.
In cooperation with Federated Garden Clubs of New Jersey.
December 3. The care of house plants.

By Instructors (Miss Jenkins).

From Station WNYC:

March 22. The small vegetable garden.
August 30. Late summer in your garden.

APPENDIX 5

FIELD TRIPS CONDUCTED

By the Curator of Plants:

May 12. Brooklyn Institute, Department of Botany. Trip to Hollis, L. I.
July 14–15. Torrey Botanical Club. Trip to the top of Slide Mt. in the Catskills.
October 7. Torrey Botanical Club. To Dunderberg Mountain.

By the Associate Curator of Plants:

March 25. Torrey Botanical Club. To Arden, N. J., to study trees.
April 21. Torrey Botanical Club and Timeology Fellowship Group. At the Garden.

By the Custodian:

June 9–10. Brooklyn Nature Club. Herons Nest, Delaware Valley, Sussex County, New Jersey.

By the Horticulturist:

March 1. Columbia University Horticultural Class in the Brooklyn Botanic Garden.

APPENDIX 6

MEETINGS OF ORGANIZATIONS AT THE GARDEN 1934

February 7. Woman's Auxiliary, Brooklyn Botanic Garden. Luncheon.
March 26. Monday Culture Charity Club.
April 9. Parent Teachers' Association, Bedford Academy.

14. American Fern Society.
16. Department of Biology, Drew University.
19. Mothers' Club, P. S. 9.
20. Fortnightly Library Club of Brooklyn.
21. Torrey Botanical Club.
21. Timeology Fellowship.
23. Woman's Auxiliary, Brooklyn Botanic Garden.

May 1. Cedarhurst-Lawrence Garden Club.
1. Cresco Garden Club.
2. Women of '76, N. S. D. A. R.
3. American Association of University Women (New York Chapter).
9. Japanese Woman's Club of New York.
10. Contemporary Club.
10. Chiropean Club.
14. Mothers' Club, P. S. 117.
14. Ladies Auxiliary, Holy Family Hospital.
15. The Junior League of Brooklyn.
15. Winters Night Club.
16. Heads of Department Association.
16. Torrey Botanical Club.
17. Far Rockaway Garden Club.
17. Woman's Guild, Church of the Evangel.
22. American Rock Garden Society.
22. Brooklyn Kindergarten Teachers Association.
22. Bergenfield Woman's Club, International Relations Garden and Liberal Arts Department.
23. Ridgewood (N. J.) Garden Club.
23. Far Rockaway Women's Club, Garden Department.
24. Mothers' Club, P. S. 225.
24. Brooklyn Nature Club.

June 7. N. S. D. A. R., Regents of New York City and Long Island.
12. Ellen Hardin Walworth Chapter, N. S. D. A. R.
13. Merrick Garden Club.
13. Milburn (N. J.) Garden Club.
18. Little Neck Garden Club.
20. P. S. 186. June Conference.

21. Prophylae of Brooklyn College.
25. St. John's University School of Pharmacy.

September 20. Executive Committee, Department of Botany, Brooklyn Institute of Arts and Sciences.

October 9. Woman's League, All Souls Church.
16. Brooklyn Section, New York Public School Kindergarten Association of New York City.
18. Department of Botany, Brooklyn Institute of Arts and Sciences.
30. Ridgewood (N. J.) Garden Club.

November 7. Woman's Auxiliary, Brooklyn Botanic Garden.
14. Department of Botany, Brooklyn Institute of Arts and Sciences.

December 12. Department of Botany, Brooklyn Institute of Arts and Sciences.

	1931	1932	1933	1934
Number of organizations	23	59	49	48
Total attendance	1146	2741	3357	1906

APPENDIX 7

REPORT ON PHOTOGRAPHIC WORK

Negatives on file December 31, 1933		8,544
Negatives accessioned during 1934		159
Total negatives on file December 31, 1934		8,703
Lantern slides on file December 31, 1933		6,090
Lantern slides accessioned during 1934		95
Total lantern slides on file December 31, 1934		6,185
Prints on file December 31, 1933		4,920
Prints made during 1934	1,909	
Used or distributed	750	
Prints filed during 1934		1,159
Total prints on file December 31, 1934		6,079
Enlargements made		24

Respectfully submitted,

FRANK STOLL,
Registrar.

APPENDIX 8

REPORT ON BROOKLYN BOTANIC GARDEN PUBLICATIONS, 1934

American Journal of Botany

Official Organ of the Botanical Society of America

Volume XXI (1934) comprised, as usual, ten monthly issues (omitting August and September), with 58 papers, 728 pages, 20 plates, and 341 text figures (as against 53 papers, 696 pages, 48 plates and 280 text figures in 1933). Dr. Arthur Harmount Graves continued on the editorial board as representative of the Brooklyn Botanic Garden. Professor Sam F. Trelease, of Columbia University, continued as Editor-in-Chief.

The circulation at the close of the fiscal year (November 30, 1934) was 1,569 as against 1,582 one year ago. The annual budget was $13,194.69 as against $12,294.38 in 1933. The year closed with a credit balance of $3,796.72 and assets over liabilities of $4,129.02 plus the value of back sets and volumes on hand.

Ecology

Official Organ of the Ecological Society of America

Quarterly. Volume XV comprised 36 papers (besides reviews, proceedings, and miscellaneous matter), 456 pages and 96 text figures (as against 28 papers, 420 pages and 138 text figures in 1933). The circulation at the close of the fiscal year (November 30, 1934) was 987 as against 943 one year ago.

The annual budget was $5,021.12, the credit balance $1,688.90 and assets over liabilities $1,727.97 (as against $5,046.50, $899.70 and $985.18 assets over liabilities in 1933) plus the value of back sets and volumes on hand. Dr. Henry K. Svenson continued on the editorial board as the Brooklyn Botanic Garden representative. Prof. Alfred E. Emerson and Prof. George D. Fuller, both of the University of Chicago, continued as Editor and Associate Editor, respectively.

Genetics

In Co-operation with the Editorial Board of Genetics

Bimonthly. Volume XIX comprised 35 papers, 634 pages, 9 plates, and 75 text figures (as against 31 papers, 555 pages, 6

plates, and 91 text figures in 1933). At the close of the fiscal year (November 30, 1934) the circulation was 652, the annual budget $9,260,49, the credit balance $3,774.18, and assets over liabilities $4,487.16 (as against 610, $5,966.98, and $1,531.01 in 1933), plus the value of back sets and volumes on hand. Dr. Donald F. Jones, Connecticut Agricultural Experiment Station, continued as Managing Editor.

Brooklyn Botanic Garden Record

Quarterly. Volume XXIII comprised 246 pages. The April number comprised the Annual Report. The circulation of the Record at the close of the year was 1,564.

Leaflets

Three single numbers and three double numbers were issued. The circulation as of December was 1,741.

Contributions and Memoirs

Numbers 66, 67, and 68 of the Contributions were published.
No Memoir was published.

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9–6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

64. Inheritance of resistance to loose and covered smut in hybrids of Hull-less with Early Gothland and Monarch oats. 28 pages. 1932.

65. Monographic studies in the genus Eleocharis—II. 34 pages. 1932.

66. Inheritance of resistance to loose and covered smut in hybrids of Black Mesdag with Hull-less, Silvermine, and Early Champion oats. 14 pages. 1934.

67. Inheritance of resistance to loose smut and covered smut in some oat hybrids. 11 pages. 1934.

68. Monographic Studies in Eleocharis—III. 13 pages. 1934.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 5. The Rock Garden. 28 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 53 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXIV JULY, 1935 NO. 3

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BOOKS AND MANUSCRIPTS
ILLUSTRATING THE
HISTORY OF BOTANY

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BROOKLYN BOTANIC GARDEN RECORD

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BOOKS AND MANUSCRIPTS
ILLUSTRATING THE
HISTORY OF BOTANY *
AN ANNOTATED LIST

" . . . the images of men's knowledge remain in books, exempt from the injuries of time, and capable of perpetual renovation."

Bacon: Advancement of Learning.

In the year 1918 two friends of the Brooklyn Botanic Garden made a contribution of $10,000 to the Endowment Fund as a memorial, specifying that the income should be used for the scientific and educational work of the Garden. At that time only $500 of the endowment had been designated for the Library.

It was Mr. Alfred T. White, then Chairman of the Botanic Garden Governing Committee, who suggested that we might like to set this sum aside to provide rare or important publications which we might otherwise feel that we could not afford. This suggestion was eagerly welcomed, as the need of income for this purpose had been keenly felt. By wise investment the principal of this fund now amounts to $13,417.20.

The items in this exhibit are only a few of the more important books with which the income from this fund has enriched our library. A very few of the items were received as gifts.

* Exhibited by the Library of the Brooklyn Botanic Garden on the occasion of its Twenty-fifth Anniversary Celebration, May 13–16, 1935. Catalog prepared by Emilie Perpall Chichester and C. Stuart Gager.

It has been gratifying to find that these volumes have not merely served sentimental or collector's interest, but are among the books most actively consulted for their contents. They are, of course, the foundational works of botanical and horticultural literature, and must be accessible to anyone whose reading or researches lead to the early history of plant study, including subject matter, the development of scientific method, the history of plant nomenclature, the evolution of our modern botanical conceptions and principles, botanical biography, and iconography. In fact, some acquaintance with these books and their authors is absolutely essential for a first hand knowledge of the history of botany, and to enable one to consider the present status of botanical science in scholarly perspective.

No gift to the Brooklyn Botanic Garden has ever met a more essential requirement. A larger endowment for the library is one of our present urgent needs.—C. S. G.

INCUNABULA

(15th Century Books)

1. Bartholomaeus Anglicus.

De Proprietibus rerum. Argentine, [Georg Husner] 1491.

The earliest edition of this work, appearing about 1470, was the first printed book of plant interest. It was a standard work on natural history throughout the Middle Ages, including the entire field of scientific knowledge in that period.

2. Columella, [L.] J. M.

[*Hortuli commentarium*] [Rome, Bart. Guldinbeck, 1485]

The very rare first separate edition of Columella's work, which consists of comments on the historical and legendary properties of various plants.

3. [Crescenzi, Piero de]

[*Opus ruralium commodorum*] [Spier, P. Drach, c1495]

Generally considered to be the most important treatise on agriculture and gardening produced in the Middle Ages.

4. Herbarius Latinus.

[Without name of place or printer, no date] [Johann Petri, Passau, c1486]

"Based largely upon pre-existing manuscripts, representing a tradition of great antiquity, the Latin Herbarius was an anonymous compilation from medieval writers and from some classical & Arabian authors."

5. Herbarius Latinus.

Arnoldus de Nova Villa. Incipit tractatus de virtutibus herbarum. Venice, 1491.

The first edition printed in Italy, but the second appearance of the cuts. All the plants described were from the Venetian region and the object of the work was to help the reader to cheap and easy remedies.

6. Herbarius Latinus.

[*Arnoldus de Nova Villa*] *Tractatus de virtutibus herbarum.* Venice, Bevilaqua, 1499. (2 copies are shown.)

Second edition of the Herbarius printed in Italy, reprinted from the 1491 edition of Achates. The wood-cuts are from the same blocks, and are uncolored. This is sometimes ascribed to Arnoldus, from the occurrence of his name at the beginning of the work.

7. [Hortus sanitatis]

Herbarius zu Teutsch und von aller Handt Kreuteren. Augsburg, Johann Schonsperger, 1488.

The German Herbarius was the foundation of the Hortus Sanitatis. According to Dr. J. F. Payne the work "forms an important landmark in the history of botanical illustration . . ."

EARLY HERBALS AND OTHER PRE-LINNEAN WORKS

8. Aldrovandi, Ulisse.

Dendrologiae naturalis scilicet arborum historiae libri duo sylva Glandaria . . . 1668 (Colophon, 1667).

First edition.

Aldrovandi established the botanic garden in Bologna in 1567.

9. Bacon, Francis.

Sylva sylvarum: or A naturall historie in ten centuries. 1627.

(Includes: *New Atlantis*). First edition. To the first of these works Bacon himself referred as "An undigested heap of particulars" suggesting problems for investigation. The second, a work of imagination, the author had represented as having already achieved some of the benefits he wished for mankind.

10. Bauhin, Caspar.

Pinax theatri botanici . . . 1671.

Includes his *Prodromos theatri botanici* . . . 1671.

"The fact of natural affinity had been recognized in the *Pinax* of Caspar Bauhin as the foundation of a natural system . . . The distinction between species and genus is fully carried out; every plant has with him a generic and a specific name, and this binary nomenclature . . . is almost perfectly maintained by Bauhin, especially in the *Pinax*," though a third and fourth word is often added to the specific name. He described about 6,000 species (vs. 600 by Dioscorides).

11. Belon [du Mans] P[ierre]

De arboribus, coniferis, resiniferis, aliis quoque nonnullis sempiterna fronde virentibus, cum earundem iconibus ad vivum expressis . . . 1553.

First edition.

The earliest work on conifers.

In his book, Le Remonstrance etc., Paris, 1558, Belon introduced, and for the first time systematically employed, binomial nomenclature for plants, 180 years before Linné.

12. Bock, Hieronymus.

Kreuter Buch darinn underscheidt, Namen unnd Würckung der Kreutter, Stauden, Hecken unnd Beumen . . . 1551.

Jerome Bock (Tragus) was a contemporary of Brunfels. "Ecology forms an item and a very distinct one in the account of almost every wild plant which he describes." He is credited with being the first to describe the stamen as made up of two distinct parts, and the first of the early German botanists to actually describe plants instead of merely repeating the descriptions of classic authors.

13. [Boyle, Robert] 1627–1691.

Some considerations touching the usefulness of experimental naturall philosophy . . . 1663.

First edition.

The First Part, written when Boyle "was scarce above 21 or 22 years old," contains paragraphs on Peruvian bark and other American drugs.

14. Brunfels, Otto.

Contrafayt Kreuterbuch nach recter vollkommener Art und Beschreibungen der Alten besstberumpten Artzt. 1532.

First German edition.

"In this whole work I have no other end in view than that of giving a prop to fallen botany; to bring back to life a science almost extinct. And because this has seemed to me to be in no other way possible than by thrusting aside all the old herbals, and publishing new and really lifelike engravings, and along with them accurate descriptions extracted from ancient and trustworthy authors, I have attempted both; using the greatest care and pains that both should be faithfully done."

15. Camerarius, Joachim.

Hortus medicus et philosophicus . . . 1588.

First edition.

(Includes: Thal, J. *Sylva Hercynia* . . . and Camerarius, J. *Icones accurate* . . .)

This, the author's chief work, is illustrated in part by Gesner's drawings. These represent a considerable advance, botanically, as they show details of floral structure on an enlarged scale. (See also No. 36.)

16. Clusius, Carolus.

Rariorum aliquot stirpium per Hispanias observatarum historia . . . 1576.

First edition.

The first original work of L'Ecluse was this account of plants observed on an expedition to Spain and Portugal. This work, says Burgess, "ushered in a new era in the definite limitation of species in Aster." It also describes some American plants.

17. Cole, William.

Adam in Eden. 1657.

First edition.

A rare herbal, in which the Doctrine of Signatures is carried to an extreme length. The author was a keen and enthusiastic collector of herbs.

18. Colonna, Fabio.

[*Phytobasanos*] *sive plantarum aliquot historia.* 1592.

First edition.

The great feature of the book is the excellence of its descriptions and figures. The latter are noted as the first etchings on copper illustrating a botanical work.

19. Columella, [L. J. M.]

De re rustica libri xii . . . 1541.

Born in the first century, at Cadiz, this celebrated Latin writer had a good practical knowledge of agriculture. His whole work is a treasury of information about ancient husbandry and the treatment of cultivated plants and trees.

20. Culpeper, Nich[olas]

Pharmacopoeia Londinensis: or the London dispensatory . . . 6th edition. 1659.

An exponent of astrological botany, Nicholas Culpeper became most unpopular with English physicians by publishing an unauthorized edition of the Pharmacopeia, issuing it under various titles.

21. Cusa, Nicolaus de. 1401–1464.

Opera. Paris, 1514.

In this book (Vol. I, folio XCVI) Cusanus (Niklas Krebs or Chrypffs) describes one of the first biological experiments of modern times. He weighed seeds and planted them in 100 pounds of soil. Afterwards he weighed the soil and the plants that grew from the seed. Since the soil lost little in weight he concluded that the plants acquired most of their weight from the water which had been added to the soil; 137 years later van Helmont (q.v., No. 41) described a similar experiment, "pirated," says Singer, from Cusanus. It was 213 years after Cusa before Hales, in his

Vegetable Staticks (1727), described his own quantitative experiments with plants.

22. Dioscorides, Pedakios Anazarbeus.

[*De materia medica libri sex. De venenatis animalibus libri duo*] Venice, 1518.

Second edition in Greek, printed in the famous Greek type of the Aldine press.

This work was the foundation of medical practice for over fifteen centuries. It lists and describes about six hundred plants, giving their medicinal properties. For a hundred years after the first Latin edition appeared, the most important herbals were in the nature of commentaries on Dioscorides.

23. Dodonaeus, Rembert.

Cruydeboeck in den welcken die gheheele historie, dat es ghewassen . . . 1554.

First edition.

Dodonaeus's most important book, which was translated and reissued many times. Meyer says: "This fortunately very unessential edition is one of the greatest rarities of botanical literature."

24. Dodonaeus, Rembert.

A Niewe herball, or historie of plantes: wherein is contayned . . . *all sortes of herbes and plantes* . . . 1578.

First edition in English. Translated by Henry Lyte, and sometimes known as "Lyte's herbal."

The most important herbal in English, until Gerarde's in 1597, which was translated from the Latin edition of this same work.

25. Evelyn, John.

Sylva, or A Discourse of Forest-trees. 1664.

First edition.

A work of the utmost importance, and the first to be printed by order of the Royal Society.

26. Fuchs, Leonhard.

De historia stirpium commentarii insignes maximis. 1542.

First edition.

The third and youngest of the German "Fathers of Botany." This, his principal work, contains over five hundred magnificent

wood-cuts of native and foreign plants drawn from nature. His chapter on "An Explanation of difficult terms" is said by E. L. Greene to be "the earliest vocabulary of botanical terms that I have met with thus far." The plate shown is one of the earliest published illustrations of Indian corn (*Zea Mays*).

27. Fuchs, Leonhard.

New Kreuterbuch. 1543.

First German edition.

This contains the same woodcuts as are in the Latin edition. Some of the plates have special interest as being the first European illustrations of American plants.

28. Fuchs, Leonhard.

Den nieuwen Herbarius, dat is, dboeck vanden cruyden . . . Gefigureert ende geconterfeyt . . . (1543).

The first and only Flemish edition.

The text in Dutch, translated from the German edition of 1543. The illustrations, although much reduced in size, are extremely fine.

29. Fuchs, Leonhar[d]

Histoire des plantes de M. Leonhart Fuschius . . . Nouvellement traduict en Francoys. 1549.

First French edition.

30. Fuchs, Leonhard.

De historia stirpium commentarii insignes. Adiectis earundem vivis, & ad naturae imitationem artificiose expressis imaginibus. 1549.

A later Latin edition, with the small woodcuts.

31. Fuchs, Leonhard.

De historia stirpium commentarii insignes. Adiectis earundem vivis, & ad naturae imitationem artificiose expressis imaginibus . . . 1551.

Still another Latin edition, attesting the popularity of Fuchs' herbal.

32. GERARDE, JOHN.

Catalogus arborum, fruticum ac plantarum tam indigenarum, quam exoticarum in horto Johannis Gerardi Ciuis & Chirurgi Londinensis nascentium. 1599.

Second edition. (A unique copy, dated 1596, is in the British Museum.)

The first complete catalogue ever published giving the contents of a single garden.

33. GERARDE, JOHN.

The Herball, or generall historie of plantes. Gathered by John Gerarde of London, Master in Chirurgerie. 1597.

First edition.

The illustration shown, of the Virginia potato, is probably the first ever published. Gerarde aimed at conveying information in simple, homely language, which would be useful to the common people.

34. GESNER, CONRADUS.

Catalogus plantarum latinè, graecè, germanicè & gallicè . . . 1542.

First edition.

Gesner, born 1516, in Zurich, is commonly considered to be the earliest botanist to recognize the value of the flowers and fruit of plants in determining affinity.

35. GESNER, CONRADUS.

De raris et admirandis herbis, quae . . . lunariae nominantur, commentariolus . . . 1555.

First edition.

A rare little book, the first to give exact descriptions of some Alpine plants.

36. GMELIN, JOHANN GEORG.

Sermo academicus de novorum vegetabilium . . . Adduntur . . . R. J. Camerarii de sexu plantarum epistola. 1749.

First edition.

In the part by Camerarius is the description of the first experimental proof that viable seeds cannot be formed without the cooperation of pollen.

37. Grew, Nehemiah.

The anatomy of vegetables begun. 1672.

First edition.

Grew (in England) and Malpighi (in Italy) were the founders of plant anatomy. They were the first to attempt to describe the more obvious anatomical and histological features of the stems, leaves, and fruits of plants.

38. Grew, Nehemiah.

Anatomy of plants with An Idea of a philosophical history of plants. 1682.

First edition of *The anatomy of plants*, and second of *The anatomy of vegetables begun.*

In Chapter V is a clear statement of the author's recognition of sex in plants.

39. Grew, Nehemiah.

Comparative anatomy of trunks. 1675.

First edition.

40. Hales, Stephi[en]

Statical essays . . . an account of some statical experiments on the sap in vegetables. 1738.

This is the third edition of the book first published in 1727, which gave one of the earliest accounts of the nutrition of plants and of the movement of sap.

41. Helmont, J. B. van.

Ortus medicinae, id est, initia physicae inaudita, progressus medicinae novus, in morborum ultionem ad vitam longam. 1651.

First *folio* edition.

van Helmont, the last of the alchemists, experimented with various gases, and was the first to propose and use the term *gas* (the "spirit of the wood"). On page 66, this word appears for the first time in scientific literature. (Cf. No. 97.)

On page 68 he describes the quantitative experiment in which he planted a willow weighing 5 lbs. in dry soil weighing 200 lbs.

At the end of five years he found the willow weighed a little over 169 lbs. ("169 & circiter uncias tres"). He did not compute the weight of the leaves that fell off, each of the four autumns. The soil and vessel weighed the same as at the beginning, therefore, the wood, bark, and roots had gained 164 lbs. van Helmont concludes from this that carbon is made only of water. It is this experiment that Singer says was "pirated" from Nicholas of Cusa (q.v., No. 21).

In this chapter van Helmont records that this same gas is a product of the fermentation of wine. It is the first description of carbon dioxide.

42. Hooke, Robert.

Micrographia: or Some physiological descriptions of minute bodies made by magnifying glasses . . . 1665.

This famous work is the earliest landmark in the history of microscopy. The illustrations, as accurate as they are beautiful, have been credited to Sir Christopher Wren. Hooke was the first user of the word "cell" to refer to the units of anatomical structure.

43. Leeuwenhoek, Antony van.

Ontledingen en ontdekkingen van de cinnaber naturalis, en buspoeder. 1686.

Includes: *Vervolg der brieven.* 1688; *Send-brieven* . . . 1718.

In addition to a vast amount of work on animalculae and plant histology, van Leeuwenhoek made many discoveries of importance to medicine. He was the first to describe the spermatozoa, to see protozoa, etc.

44. Leeuwenhoek, Antony van.

Opera omnia. 1695–1719. 4 vols.

Vol. 1. *Arcana naturae.*

First edition in Latin.

Leeuwenhoek constructed his own microscope and found new marvels in all nature. He gave the first complete account of the red blood corpuscles, found microörganisms in the teeth, and discovered the existence of bacteria.

45. Lobel, Matthia[s]

Plantarum seu stirpium historia . . . cui annexum est adversariorum volumen. 1576.

First edition.

Lobel distinguished different groups of plants by the peculiarities of their leaves, thus forming a scheme of classification, some parts of which, such as Cruciferae and Labiatae, are recognized to this day.

46. Malpighi, Marcello.

Anatome plantarum. 2 vols. 1675–79.

First edition.

While Hooke was making random sections of both plant and animal tissues and studying their structure, Malpighi and Grew were systematically examining and drawing vegetable tissues under the microscope, and laying the foundations of the science of plant anatomy.

47. Mattioli, Pierandrea.

Di Pedacio Dioscoride Anazarbeo libri cinque della historia & materia medicinale tradotti in lingua volgare italiana. 1544.

First Italian edition of Dioscorides, and first edition of Mattioli's commentary.

A monumental work, the commentary on Dioscorides, issued in more than sixty editions and translated into many languages, was in reality a natural history of all plants known to Mattioli. Dioscorides described about 600 species. Mattioli added between 200 and 300 from Southern Europe.

48. Mattioli, Pierandrea.

Commentarii, in libros sex Pedacii Dioscoridis Anazarbei, de materia medica. Adiectis quam plurimis plantarum & animalium imaginibus, eodem authore. 1554.

First Latin edition.

This was the first edition to be illustrated. It has small, very clear wood-cuts.

49. MATTIOLI, PIERANDREA.

New Kreuterbuch. Mit dem allerschönsten und artlichsten Figuren aller Gewechse . . . 1563.

The first German edition.

This, the second edition printed at Prague, contains a new set of large wood-cuts, very much more detailed than the earlier ones.

50. MICHELI, PIER ANTONIO.

Nova plantarum genera juxta Tournefortii methodum disposita. 1729.

First edition.

Born at Florence, in 1679, Micheli was the Director of the Botanic Garden there. He was one of the earliest botanists to study mosses and the lower cryptogams, and endeavored to prove the presence of sexual organs in these plants.

51. PARKINSON, JOHN.

Paradisi in sole, paradisus terrestris. 1629.

First edition.

Contains directions for the planting and care of gardens, with descriptions of a large number of plants then in cultivation, with their uses and virtues. Parkinson's scheme of classification is not as good as Lobel's. The title page contains an illustration of the fabled "Scythian Lamb." The first three words of the title are a Latin pun on the author's name.

52. PLINIUS SECUNDUS, CAJUS.

Historia naturale . . . in volgare tradotta per Christophoro Landino. 1534.

A contemporary of Dioscorides, Pliny wrote an encyclopedic account of the knowledge of his own times. He refers to a large number of plants, but only by way of other authors, not because of original observation from nature.

53. [JAMES I. (of England)]

Proclamation concerning starch . . . by the king. Given at Salisbury the 23. day of August, in the fifth yeere of our Reigne. 1607.

"Corn," i.e., wheat, was too much needed for food to be wasted in making starch for ruffs and laces. Hence the laws and prohibitions concerning its making.

54. Porta, Giovanni Battista.

Phytognomonica . . . octo libris contenta. [1588]

First edition.

These illustrations interpret the "Doctrine of signatures," with which Porta was much occupied. The parts of the body cured by certain herbs, or the animal whose bite or sting was cured by it, are shown in the same picture. Porta, says Greene, "was guided by . . . ecology, forms of roots, of leaves, and vegetative organs generally."

55. Porta, Giovanni Battista.

Villae libri xii . . . 1592.

First complete edition.

An interesting, practical treatise on farming, gardening, and agriculture.

56. Ray, John.

Catalogus plantarum circa Cantabrigiam. 1660.

First edition.

John Ray, "the father of English Naturalists," has been described as "the greatest European botanist of the seventeenth century." This, his first book, embodies his work on the flora about Cambridge.

57. Ray, John.

Historia plantarum . . . de plantis in genere . . . 2 vols. 1686.

Vol. 3, Supplement. 1704.

Ray inaugurated a natural system of classification, making use of characters afforded by the fruit and flower as well as other parts of the plant. This work summarizes the chief facts then known about the functions and structure of plants, and describes 18,625 species (vs. 600 by Dioscorides and Bock, 6000 by Bauhin, etc.). Carefully studied by Linnaeus.

"My reasons for attempting this work were . . . To give some light to young students . . . To facilitate the learning of plants . . . without a guide or demonstrator . . . [so] that it shall not be difficult for any man who shall but attend to them and the de-

scription, to find out infallibly any plant that shall be offered to him, especially being assisted by the figure of it."

"I may truly say that if . . . you would, after just examination, weigh my 'History of Plants' in the incorrupt balance of impartial judgment, you would find it rather to need pardon than to merit praise, so many defects and errors there might be discovered therein."

58. Ray, John.

Methodus plantarum nova. 1682.

First edition.

It was in this volume that Ray described the true nature of buds, speaking of them as annual plants springing from old stock. He also recognized, though not naming them, the basic divisions of Monocotyledons and Dicotyledons.

59. Ray, John.

Stirpium Europaearum extra Britannias nascentium sylloge . . . 1694.

First edition.

60. Ray, John.

Synopsis methodica stirpium Britannicarum . . . cum indice & virium epitome. 1690.

First edition.

The first systematic British flora. In this work, and in his later *Sylloge* (1694), Ray accepts Grew's teaching that the stamens are male organs.

61. Ray, John.

De variis plantarum methodis dissertatio brevis . . . 1696.

First edition.

62. Redi, Francesco.

Experimenta circa generationem insectorum ad nobilissimum virum, Carolum Dati. 1671.

Second edition and first Latin translation.

By experiment, Redi proved that grubs and maggots do not develop spontaneously in decaying matter; he thus helped to lay the foundations of biogenesis.

63. Regimen sanitatis *Magnini Mediolanensis medici famosissimi attrebatensi episcopo directum. In super opusculum de fleubothomia editu a . . . magistro Reginaldo de villa nova . . .* 1506.

A handbook of household medicine, popular during the Middle Ages, here edited by Arnoldus de Villa Nova.

64. Tabernaemontanus, Jacob Theodor.

Neuw Kreuterbuch . . . 2 pts. in 1 vol. 1588–1591.

First edition.

A large and finely illustrated work, written by a herbalist who had been a pupil of Bock and Brunfels.

65. Theophrastus.

De historia plantarum libri IX . . . 1552.

The pupil and successor to Aristotle, Theophrastus is known as the "Father of Botany." In this book, first printed in 1483, he mentions about four hundred and fifty plants, but his descriptions are vague and the plants extremely difficult to identify.

66. Tournefort, Joseph Pitton de.

Institutiones rei herbariae. Edito altera, gallica longe auctior. 3 vols. 1700–[1703].

Tournefort's system of classification was an artificial one, based on the characters of one organ, the corolla.

67. Tradescant, John (junior)

Musaeum Tradescantianum, or a collection of rarities preserved at South Lambeth neer London. 1656.

Contains also a list of the plants then growing in the famous garden of John Tradescant, senior, gardener to Charles I.

68. Vallisnieri [de Vallisnera], Antonio.

Dialoghi sopra la curiosa origine di molti insetti. 1700.

Bound with his *Prima raccolta d'osservationi e d'esperienze.* 1710.

He demonstrated that insect larvae in plant "galls" originated from eggs deposited by insects, thus helping to establish the principle of biogenesis.

CARL VON LINNÉ. 1707–1778

First Editions of His Works

69. *Amoenitates academicae, seu dissertationes variae physicae, medicae, botanicae . . . 7* vols. Lugduni Batavorum, 1749–1769.

Vols. 3–7, First edition.

70. *Classes plantarum; seu, Systemata plantarum omnia a fructificatione desumta . . . Fundamentorum botanicorum pars 2.* Lugduni Batavorum, 1738.

71. *Critica botanica . . . seu Fundamentorum botanicorum pars IV. Accedit Johannis Browallii. De necessitate historiae naturalis discursus.* Lugduni Batavorum, 1737.

72. *Flora lapponica.* Amstelaedami, 1737.

73. *Flora svecica.* Stockholmiae, 1745.

74. *Flora zeylanica; sistens plantas indicas Zeylonae insulae.* Holmiae, 1747.

75. *Hortus Cliffortianus; plantas exhibens quas in hortis tam vivis quam siccis, Hartecampi in Hollandia, coluit . . . Georgius Clifford . . .* Amstelaedami, 1737.

76. *Hortus Upsaliensis, exhibens plantas exoticas, horto Upsaliensis academiae . . . Vol. 1.* Stockholm, 1748.

77. *Musa Cliffortiana florens Hartecampi 1736 prope Harlemum.* Lugduni Batavorum, 1736.

78. *Philosophia botanica in qua explicantur fundamenta botanica . . .* Stockholm, 1751.

79. *Species plantarum exhibentes plantas rite cognitas ad genera relatas . . . secundum systema sexuale digestas.* Holmiae, 1753. 2 vols.

This book is the starting-point for the modern scientific names of plants, and for the uniform, systematic use of binomials in naming plants.

80. *An autograph letter written to the Duc du Chesne,* recommending a friend and asking for seeds, signed "C. Linné."

POST–LINNAEAN BOTANICAL CLASSICS

81. Brown, Robert.

Observations on the organs and mode of fecundation in Orchideae and Asclepiadeae. Reprint in *The Miscellaneous Botanical Work of Robert Brown* (Ray Society, London, 1866) of Brown's paper originally published in the *Transactions of the Linnean Society,* **16**: 685–745. 1833.

It is in this paper that the discovery of the nucleus is first announced as an organ of the cell. "In each cell of the epidermis of a great part of this family [Orchideae] . . . a single circular areola, generally somewhat more opaque than the membrane of the cell, is observable . . . There is no regularity as to its place in the cell; it is not infrequently however central or nearly so . . . This areola, or nucleus of the cell as perhaps it might be termed, is not confined to the epidermis," etc.

82. [Chambers, Robert]

Vestiges of the natural history of creation, with a sequel. New York, 1846. Anonymous reprint of the original London edition of 1844 advertised under the pseudonym, "Sir Richard Vyvyan, Bart., M.P., F.R.S., &c."

Did much to remove bias and prejudice against the idea of organic evolution. A storm of abuse that would otherwise have been added to what Darwin did receive, was diverted to the author of the *Vestiges.* "It is full of apt and forcible illustrations of pseudo-scientific realism" (Huxley). "A time when there was no life is first seen. We then see life begin *and go on* . . . This is a wonderful revelation to have come upon the men of our time . . . The great fact established by it is, that the organic creation, as we now see it, was not placed upon the earth at once;—it observed a PROGRESS . . . We can *imagine* Divine power evoking a whole creation into being by one word; but we find that such had not been his mode of working in that instance [ontogeny], for geology fully proves that organic creation passed through a series of stages before the highest vegetable and animal forms appeared.

Here we have the first hint of organic creation having arisen in the manner of natural order." (page 216.)

From Darwin:

"Have you read that strange, unphilosophical, but capitally written book, the '*Vestiges*': it has made more talk than any work of late, and has been by some attributed to me . . . "

"Have you seen the slashing article of December 26 [1859] in the *Daily News,* against my stealing from my 'master,' the author of the *Vestiges?*" (Darwin to Huxley.)

"I must think that such a book, if it does no other good, spreads the taste for Natural Science."

" . . . at other times I really feel as much ashamed of myself as the author of the *Vestiges* ought to be of himself."

From Huxley:

" . . . the only review I ever have qualms of conscience about, on the ground of needless savagery, is the one I wrote on the '*Vestiges.*'"

83. [Chambers, Robert]

Explanations: A sequel to "Vestiges of the natural history of creation." New York, 1846.

"I am at the very first struck by the great *à priori* unlikelihood that there can have been two modes of Divine working in the history of nature—namely, a system of fixed order or law in the formation of globes and a system in any degree different in the peopling of these globes with plants and animals . . . it would require very decisive counter-evidence to forbid the conclusion that the organic creation originated in law."

84. Goethe, J. W. von.

Versuch die Metamorphose der Pflanzen zu erklaren. 1790.
First edition.
Goethe recognized the homologies of different parts of the plant. "It is open to observation that certain exterior parts of plants sometimes change and pass into the form of adjacent parts, either wholly or in a greater or less degree." However, he confused abnormal with normal metamorphoses.

85. Hedwig, Johanne.

Theoria generationis . . . plantarum cryptogamicarum Linnaei . . . 1784.

First edition.

A pioneer and important contribution to our knowledge of ferns, mosses, and other cryptogams. Hedwig is considered to be the founder of our scientific knowledge of Mosses (Bryology).

86. Hill, John.

The British herbal . . . 1756.

First edition.

87. Hosack, David.

Hortus Elginensis: or, A catalogue of plants, indigenous and exotic, cultivated in the Elgin botanic garden, in the vicinity of New-York . . . 1811.

Second edition, enlarged.

Rockefeller Center, New York City, is on the site of this garden.

88. Hofmeister, Wilhelm.

On the germination, development and fructification of the higher cryptogamia . . . trans. by Frederick Currey. 1862.

The marvelous results of researches on the reproduction of the lower plants. This is one of the most important botanical works of all time, and helped lay the foundations of our knowledge of the alternation of generations through the plant kingdom.

89. Humboldt, Alexander von and Aimé de Bonpland.

Essai sur la géographie des plantes . . . 1805.

Second edition.

The foundation of the science of plant geography; the adaptation of plants to their environment, and the comparison of vegetation of different latitudes.

90. Humboldt, Alexander von and Aimé de Bonpland.

Ideen zu einer Geographie der Pflanzen . . . 1807.

German translation of their *Essai sur la géographie des plantes . . .* This edition has a map which shows vegetation in relation to altitude—perhaps the first ever published.

91. Humboldt, Alexander von.

Ideen zu einer Physiognomik der Gewächse. 1806.
First edition.

92. Ingen-Housz, John.

Experiments upon vegetables, discovering their great power of purifying the common air in the sun-shine, and of injuring it in the shade and at night. London, 1779.
First edition.

Ingen-Housz acknowledges his indebtedness to Priestley as the source of his inspiration. His conclusions were "the result of above 500 experiments" (page xiii). He demonstrated that green plants take in carbon dioxide and give off oxygen, but *only in daylight.*

"One leaf of a vine, shut up in an ounce phial, full of air fouled by breathing so that a candle would not burn in it, restored this air to the goodness of common air in the space of an hour and a half. But plants enjoy this privilege only in the day-time, and when they grow in unshaded places" (page 39).

(Cf. Nos. 41, 97, 98, 101, 108.)

93. Mendel, Gregor.

Versuche über Pflanzen-Hybriden (in Naturforschender Verein. Brünn, (Austria). Verhandlungen. Vol. 4, 1866.)

The famous description of his experiments on peas, made by Mendel in the monastery garden at Brünn, was the foundation of the scientific study of heredity.

On page 21 there is an error of fact, since the first hybrid (F_1) generation of pea seeds (from a cross between "smooth" and "wrinkled" seed parents) are described as "smooth or wrinkled." Probably this error is due to careless preparation of MS. or careless proof-reading.

94. Mohl, Hugo von.

Vermischte Schriften botanischen Inhalts. 1845.

A collection of the earlier works of the most important of the founders of plant cytology. von Mohl first used the term protoplasm (1846) in its modern sense, to describe the living substance of plants and animals.

95. Parmentier, [A. A.]

Traité sur la culture et les usages des pommes de terre, de la patate, et de topinambour . . . 1789.

First edition.

It was Parmentier who introduced the potato as an article of food into France.

96. Persoon, C. H.

Icones pictae specierum rariorum fungorum in synopsi methodica descriptarum . . . 1803–08. 4 pts. in 1 vol.

First edition.

97. Priestley, Joseph.

Experiments and observations on different kinds of air. 1774.

First edition. (Vol. 1 only.)

Priestley, the discoverer of oxygen, made pioneer studies of the function of chlorophyll. He showed experimentally that plants cannot live in an atmosphere of carbon dioxide ("fixed air"), i.e., without oxygen. He rejected van Helmont's term "gas," as being a needless introduction of a new word, using instead the word "air" in a generic sense.

(Cf. Nos. 41, 92, 98, 101, 108.)

98. Priestley, Joseph.

Experiments and observations relating to various branches of natural philosophy. 1779.

First edition.

In Section XXVIII he describes a "quantitative" experiment showing that green plants may decrease the amount of carbon dioxide ("fixed air") and increase the amount of oxygen ("dephlogisticated" air).

"On the 28th May I introduced a shoot of a strawberry plant into a jar containing air vitiated partly by the burning of candles, and partly by other means, till one measure of it and one of nitrous air occupied the space of 1.62 measures; and on the 10th of June this air was so far improved, that when it was tried in the same manner, the measures of the test were 1.4, and a candle did not immediately go out in it" (page 305).

(Cf. Nos. 41, 92, 97, 101, 108.)

99. Prince, William.

Catalogue of fruit and ornamental trees . . . cultivated at the Linnean botanic garden . . . Flushing, N. Y. 1823.

The Prince nursery was one of the earliest and most important in America. It is stated that this nursery was the first to introduce *Mahonia* into American gardens.

100. Prince, William.

A short treatise on horticulture . . . 1828.

101. Saussure, Nicolas Théodore de.

Recherches chimiques sur la végétation. (Paris An XII.) 1804.

First edition.

Saussure established the fact that oxygen is indispensable to the life of the plant, and that all parts of the plant, in darkness as well as in light, take in oxygen and give off carbon dioxide—that is, they respire the same as do animals.

(Cf. Nos. 41, 92, 97, 98, 108.)

102. Schleiden, M. J.

Beiträge zur Phytogenesis. (In *Beiträge zur Botanik.* I. p. 121–159. Leipzig, 1844. Reprinted from Müller's *Archiv,* 1838. p. 137.)

This is the paper usually cited as having given the suggestion and inspiration to Schwann for the elaboration of the epoch-making generalization, *the cell-theory.* Schwann, however, cites a paper by Schleiden published in October, 1837. Strange to say, the paper which laid the foundation of the cell-theory is largely devoted to "demonstrating" two errors of observation, one (page 149) that cells reproduce by the "formation of cells within cells" (not by cell-division as is now known). "The process of cell-formation, which I have just endeavored to describe in detail, is that which I have observed in most of the plants which I have investigated," says Schleiden. The other error (page 128) is that the embryo develops at the tip of the pollen-tube. This is illustrated by numerous careful drawings from nature! Unfortu-

nately the former error was perpetuated by Schwann and persisted for some time thereafter.

103. Schouw, Joachim Frederic.

Naturschilderungen. Kiel, 1840.
German translation from the original Danish.
"Material nature has undergone a development. We have sought to demonstrate that the plant world and also the animal world shows evidence of an historical development," not having been created "at once," but "by degrees."

104. Schouw, Joachim Frederic.

The Earth, plants, and man. London, 1852.
English translation from the German (1823) by Arthur Henfrey, of this important pre-Darwinian discussion of the origin of species. Not in Pritzel.

105. Schouw, Joachim Frederic.

The origin of the existing vegetable creation. English translation by N. Wallich from the Danish. ("Transactions of the Meeting of Scandinavian Naturalists at Copenhagen in 1847." Appendix K, p. 119.) *Hooker's Journal of Botany and Kew Garden Miscellany 2,* No. 23: 321–326; No. 24: 373–377. 1850, and *3,* No. 25: 11–14. 1851.
The existence of the same species of plant in widely separated countries is not due to migration from a "centrum" or single point of origin, but to the fact that "the same species has originally appeared in several, often far distant, places." ("Schouw's hypothesis.") This was earlier taught by Gmelin (1747), but was elaborated by Schouw.
"I look upon it as highly probable, if not absolutely demonstrated, that no species are any longer created."

106. Schwann, Theodor.

Mikroskopische Untersuchungen über die Übereinstimmung in der Struktur und dem Wachsthum der Thiere und Pflanzen. 1839.
The basis of the modern cell-theory—the foundation on which both animal and vegetable biology have developed.

107. SCHWANN, THEODOR.

Microscopical researches into the accordance in the structure and growth of animals and plants. Sydenham Society, London, 1847.

This is the English translation by Henry Smith of Schwann's epoch-making paper, *Mikroskopische Untersuchungen,* etc., published in 1839. One of the great classics in biology, "The object of the present treatise is to prove the most intimate connection of the two kingdoms of organic nature, from the similarity in the laws of development of the elementary parts of animals and plants . . . Schleiden communicated the results of his investigations to me previous to their publication in October, 1837," says Schwann. "The development of the proposition, that there exists one general principle for the formation of all organic productions, and that this principle is the formation of cells, as well as the conclusions that may be drawn from this proposition, may be comprised under the term *cell-theory*" (Schwann).

108. SENEBIER, JEAN.

Physiologie végétale . . . Geneva, 1800.

First edition.

Senebier made fundamental contributions to our understanding of the functions of respiration and photosynthesis. "Leaves restore to the air a part of the oxygen gas which animal life and various other circumstances take from it, as Priestley, Ingenhous, and I have shown."

(Cf. Nos. 41, 92, 97, 98, 101.)

109. SPALLANZANI, [LAZARO]

Experiences pour servir a l'histoire de la génération des animaux et des plantes . . . 1785.

First edition.

Helped to lay the foundation of the doctrine of biogenesis.

110. SPALLANZANI, [LAZARO]

Nouvelles recherches sur les découvertes microscopiques et la génération des corps organisés . . . 2 pts. in 1 vol. 1769.

One of the first experimental disproofs of the idea of spontaneous generation.

111. Wallace, Alfred Russel.

Palm trees of the Amazon and their uses. 1853.
First edition.

ASSOCIATION BOOKS

112. Alpinus, Prosper.

Historia Aegypti naturalis . . . 1735.
Peter Collinson's copy with signatures on two title pages and page of text in his handwriting.

113. Boerhaave, Hermann.

Index alter plantarum quae in horto academico Lugduno-Batavo aluntur. 2 pts. in 1 vol. 1720. First edition.
Author's presentation copy.
On title page "D. Isaaco Rand Botanico peritissimo amicitiae ergo mittit auctor."

114. Candolle, August Pyram[us] de.

Plantes rares du jardin de Genève . . . 1829.
Author's presentation copy.
Letter and inscription to Mlle. Anastatia de Klustine, dated November 20, 1830. Letter signed A. P. de Candolle.

115. Crescenzi, Piero de.

De agricultura vulgare. 1511.
Third Italian edition.
From the library of William Morris, with his bookplate.

116. Darlington, William.

Flora cestrica: an attempt to enumerate and describe the flowering and filicoid plants of Chester county . . . 1837.
Author's presentation copy: "Dr. F. Boott with the best respects of the Author."
A. L. S. of author inserted.

117. Gray, Asa.

Manual of the botany of the northern United States, from New England to Wisconsin and south to Ohio and Pennsylvania inclusive. 1848.
Author's presentation copy. "Dr. Boott from his attached friend the Author." A. L. S. inserted.

118. Grew, Nehemiah.

Musaeum regalis societatis. Or, a catalogue of . . . rarities belonging to the Royal society . . . 1681. First edition.

This copy once belonged to Abigail Adams, wife of John Adams, who, in 1785, was first ambassador from the U. S. to the Court of St. James. It has also on the title page the signature of H. L. Piozzi (Hester Lynch Salisbury Piozzi), Dr. Johnson's friend, Mrs. Thrale.

119. Hooker, Joseph Dalton.

Sketch of the life and labours of Sir William Jackson Hooker.

Has note: "Own copy J. D. H."

Inserted in this copy is a written list of persons to whom were sent copies of the Life of Sir W. J. Hooker.

120. Munting, Abraham.

De vera antiquorum herba Britannica . . . 1681.

Signature of Joseph Miller, facing title page, and bookplate of the Society of Apothecaries.

121. Pasteur, Louis.

Études sur la bière. 1876.

Author's autograph copy. (À Monsieur Van Tieghem. Souvenir affectueux. L. Pasteur.)

Pasteur's discovery that fermentation is caused by micro-organisms revolutionized the brewing industry, and laid the foundations of modern antiseptic surgery, the germ-theory of disease, soil science, the theory of crop-rotation—in fact, the whole science of bacteriology.

122. Schweinitz, Ludwig David von.

Synopsis fungorum Carolinae superioris secundum observationes . . . 1822.

On dedication page is the signature of A. Gray, Aug. 1885.

123. Torrey, John and Asa Gray.

A flora of North America . . . arranged according to the natural system. Vol. 1, pt. 1. 1838.

George Bentham's copy, from the authors.

124. Vries, Hugo de.

Intracellular pangenesis. Original typewritten mss. with pencilled notes in the handwriting of Professor deVries and revisions by the translator, C. Stuart Gager. 1908.

Autograph letters, signed, by deVries and by Strasburger, regarding this translation.

MS., signed, in handwriting of Eduard Strasburger, of his *Introduction* to the translation. "The *Intracellulare Pangenesis*, of Hugo de Vries, was such a source of stimulation to me at the time of its appearance that I feel greatly indebted to its author."

DARWINIANA

[Darwin, Erasmus] 1731–1802.

125. *The Botanic garden; a poem in two parts.* London, 1791.

First edition of part 1, second edition of part 2.

The grandfather of Charles Darwin here presents to his contemporaries the state of scientific knowledge in their day, together with glimpses of the coming world in which, as he knew, humanity would have changed its habits very greatly.

An illustration by William Blake.

"The work as a whole takes an extremely distinguished place among the best bad books in the language." (John Drinkwater.)

"*Bookseller:* Then it is not of any consequence whether the representations correspond with nature?

Poet [*Darwin*]: Not if they so much interest the reader as to induce the reverie above described."

The persistent error that "leaves are the lungs of plants" is first (?) proposed and elaborated in this book: "The analogy between the leaves of plants and the lungs or gills of animals seems to embrace so many circumstances, that we can scarcely withhold our assent to their performing similar offices."

Darwin, Charles Robert. 1809–1882.

126. *The descent of man, and selection in relation to sex.* First edition. London, 1871.

The first edition appeared on the day the treaty of peace was signed that ended the Franco-Prussian war—February 14, 1871.

"I was partly led to do this [book] by having been taunted that

I concealed my views, but chiefly from the interest which I had long taken in the subject."—*Darwin to A. de Candolle.*

"The 'Descent of Man' took me three years to write, but then as usual some of this time was lost by ill health, and some was consumed by preparing new editions and other minor works."—*Autobiography.*

"During many years I collected notes on the origin or descent of man, without any intention of publishing on the subject . . . as I thought that I should thus only add to the prejudices against my views."—*Introduction.*

127. *The different forms of flowers on plants of the same species.* First edition. London, 1877.

". . . no little discovery of mine ever gave me so much pleasure as the making out the meaning of heterostyled flowers."—*Autobiography.*

128. *The effects of cross and self fertilisation in the vegetable kingdom.* First edition. London, 1876.

Records one of the first recognitions and clear descriptions of "hybrid vigor."

"I was led to make, during eleven years, the numerous experiments, recorded in this volume, by a mere accidental observation; and indeed it required the accident to be repeated before my attention was thoroughly aroused to the remarkable fact that the seedlings of self-fertilised parentage are inferior, even in the first generation, in height and vigour to seedlings of cross-fertilised parentage."—*Autobiography.*

129. *The expression of the emotions in man and animals.* First edition. London, 1872.

Begun January 17, 1871, "the last proof of the 'Descent of Man' having been finished on January 15." 5267 copies were sold on the day of publication.

". . . the subject is in no way an important one; it is simply a 'hobby-horse' with me, about twenty-seven years old."

" My first child was born on December 27, 1839, and I at once commenced to make notes on the first dawn of the various expressions which he exhibited, for I felt convinced, even at this early period, that the most complex and fine shades of expression must all have had a gradual and natural origin."—*Autobiography.*

130. *The formation of vegetable mould, through the action of worms, with observations on their habits.* First edition. London, 1881.

". . . I know not whether it will interest any readers, but it has interested me."—*Autobiography.*

8500 copies sold between November, 1881, and February, 1884.

131. *Insectivorous plants.* First edition. London, 1875.

". . . whenever I had leisure I pursued my experiments, and my book on 'Insectivorous Plants' was published in July, 1875—that is, sixteen years after my first observations."—*Autobiography.*

2700 copies were sold out of an edition of 3000.

" You ask about my book, and all I can say is that I am ready to commit suicide . . . I begin to think that everyone who publishes a book is a fool."—*Darwin to J. D. Hooker.*

". . . at the present moment I care more about Drosera than the origin of all the species in the world."—*Darwin to Lyell, November, 1861.*

132. *Journal and remarks.* London, 1839.

Being Vol. III of the Narrative of the surveying voyages of H.M.S. Adventure and Beagle . . . First edition. 1832–1836.

The voyage of the " Beagle " was, in Darwin's own words, " by far the most important event in my life, and has determined my whole career."

" The success of this, my first literary child, always tickles my vanity more than that of any of my other books."—*Autobiography.*

" . . . my 'Journal of Researches' was seen in MS. by an eminent semi-scientific man, and was pronounced unfit for publication."—Darwin, *Life and Letters.* 2: 243.

133. *On the movements and habits of climbing plants.* London, 1867.

Read before a meeting of the Linnean Society, February 2, 1865. First published in its Journal. Vol. 9. Botany. pp. 1–118.

"I was led to take up this subject by reading a short paper by Asa Gray, published in 1858."—*Autobiography.*

134. *On the origin of species by means of natural selection.* First edition. London, 1859.

"My confounded book which half killed me."—*Darwin to J. D. Hooker, October 15, 1859.*

"Only an abstract."—*Darwin to Agassiz.*

"I find, alas! each chapter takes me on an average of three months, so slow I am."—*Darwin to Asa Gray, April 4, 1859.*

"Your glorious book."—*J. D. Hooker to Darwin.*

"It is the very hardest book to read, to full profits, that I ever tried—it is so cram-full of matter and reasoning."—*Hooker to Darwin, December, 1859.*

"I do not think twenty years too much time to produce such a book in . . . I am free to say that I never learnt so much from one book as I have from yours."—*Asa Gray, January 1, 1860.*

This book produced a revolution in human thinking, and ranks as one of the three or four greatest books of all time.

Whewell, the historian of science, refused to allow a copy of the *Origin* to be placed in the library of Trinity College, Cambridge, for some years.

135. *On the various contrivances by which British and foreign orchids are fertilised by insects.* First edition. London, 1862.

"On May 15, 1862, my little book on the 'Fertilisation of Orchids,' which cost me ten months' work, was published: most of the facts had been slowly accumulated during several previous years . . . my interest in [the subject] was greatly enhanced by having procured and read in 1841, through the advice of Robert Brown, a copy of C. K. Sprengel's wonderful book, 'Das entdeckte Geheimness der Natur'."—*Autobiography.*

136. *The power of movement in plants.* First edition. London, 1880.

"In 1880 I published, with Frank's (his son, Francis Darwin) assistance, our 'Power of Movement in Plants.' This was a tough piece of work."—*Autobiography.*

137. *The variation of animals and plants under domestication.* 2 vols. First edition. London, 1868.

First published January 30, 1868, 1500 copies sold in one week. A second edition appeared in February of the same year.

"I have sent the MS. of my big book, and horridly, disgustingly big it will be, to the printers."—*Darwin to Huxley.*

"It has been an awful job: seven and a half months correcting the press."—*Darwin to J. D. Hooker.*

"It was a big book and cost me four years and two months of hard labor . . . Towards the end of the work I give my well-abused hypothesis of Pangenesis."—*Autobiography.*

"The chapter on what I call Pangenesis will be called a mad dream . . . but at the bottom of my own mind I think it contains a great truth."—*Darwin to Asa Gray.*

"The greater part, as you will see, is not meant to be read."—*Darwin to Fritz Müller.*

"About my book I will give you a bit of advice. Skip the *whole* of Vol. I., except the last chapter (and that need only be skimmed) and skip largely in the 2nd volume; and then you will say it is a very good book."—*Darwin to J. D. Hooker.*

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138. Buller, Sir Walter L.

Illustrations of Darwinism, and other papers. (Repr. Transactions of the New Zealand Institute, Vol. 27, 1895.)

Presentation copy "From the Author" (to J. D. Hooker).

139. Candolle, Alphonse de.

Darwin considéré au point de vue des causes de son succès . . . Genève, 1882.

Presentation copy "À Sir Joseph Hooker de la part de l'auteur."

140. Carpenter, W. B.

Charles Darwin: his life and work. (Repr. from The Modern Review, July, 1882.)

Presentation copy "Sir Joseph D. Hooker from his friend the Author."

141. Crawfurd, John.

On the theory of the origin of species by natural selection in the struggle for life. London, 1868.

Presentation copy "J. D. Hooker from the Author."

142. Darwin, Charles Robert.

Extracts from letters addressed to Professor Henslow.

They were printed for distribution among members of the Cambridge Philosophical Society and read at a meeting on the 16th of November, 1835. Dawson Turner's autographed copy, given him by Professor Adam Sedgwick, 1836. Contains an A. L. S. of Sedgwick.

143. Darwin, Charles Robert.

Manuscript in Darwin's hand, giving his own comments on the article by the Bishop of Oxford concerning the Origin of Species.

144. Darwin, Charles [Robert]

Notes on the fertilization of orchids.

Presentation copy "From the Author."

145. Hopkinson, John.

Charles Darwin: an address . . . Hertford, 1893.

Presentation copy "Sir J. D. Hooker. With the Author's Compliments."

146. Jackson, Benjamin Daydon.

Darwiniana: being a reprint of three short essays prepared for the Darwin centenary held at Cambridge, June 22–24, 1909.

Contains a list of plants named after Darwin.

147. Symonds, Rev. W. S.

A lecture on progress and development. London, n.d.
Presentation copy "J. D. Hooker from the Author."

148. [Wilberforce, Bishop of Oxford]

"On the origin of species, by means of natural selection . . . London, 1860."

This is the virulent review of the *Origin of Species* which appeared in the *Quarterly Review,* 108, No.215: p.225–264. July, 1860. The authorship was afterwards acknowledged by Samuel Wilberforce, then Bishop of Oxford. The article is accompanied by a seven-page MS. in the handwriting of Charles Darwin (Cf. No. 143) refuting the extraordinary statements in the *Review.* These notes were prepared by Darwin for Sir Joseph Hooker, and suggest points of attack against the Bishop. This appears to be the actual copy of the article in Hooker's hands in his speech at the now famous meeting of the British Association in Oxford, July, 1860, when the Bishop ("Sam Oxon") was dramatically refuted by Huxley, Hooker, and others.

". . . a most ridiculous article," wrote Hooker, "absurd for its egregious ignorance and blunders in Nat. Science."

"I swore to myself," said Hooker, "that I would smite the Amalekite, Sam, hip and thigh if my heart jumped out of my mouth . . ."

Portraits

149. Photograph of Charles Darwin at the age of 73, taken in 1881.

150. Caricature of Charles Darwin. A colored print from *Vanity Fair,* September 30, 1871.

Autographs

151. A letter to the Secretary of the British Association.

152. Note taken from a scrapbook belonging to Charles Cardale Babington, St. Johns College, Cambridge.

153. A letter [to Dr. Davy (?)].

AUTOGRAPHS AND AUTOGRAPHED LETTERS

154. Boussingault, Jean Baptiste-Joseph

155. Brongniart, A. T.

156. Brown, Robert

157. Darlington, William

158. Darwin, Charles [Robert]

Exhibited with Darwiniana.

159. Darwin, Erasmus

160. Davy, Sir Humphry

161. De Caisne, Joseph

162. Durand, Elias

163. Gray, Asa

164. Hales, Stephen

165. Hooker, Sir Joseph D.

166. Hooker, Sir William Jackson

167. Hosack, David

168. Humboldt, Alexander von

169. Huxley, Thomas Henry

170. Lavoisier, Antoine Laurent

171. Lindley, John

172. Linné, Carl von

Exhibited with other Linné items.

173. Michaux, F. André

174. Mirbel, Charles

175. Parmentier, Antoine Augustin

176. Persoon, Christian Hendrik

177. Saccardo, Pier Andrea

178. Sowerby, James De Carle

179. Watson, Sereno

PUBLICATIONS ISSUED BY THE BROOKLYN BOTANIC GARDEN

180. The American Journal of Botany.

Official organ of the Botanical Society of America. Devoted to all branches of botanical science. Established, January, 1914.

181. Ecology.

The official publication of the Ecological Society of America. All forms of life in relation to environment. Established, January, 1920.

182. Genetics.

A periodical record of investigations bearing on heredity and variation. Established, January, 1916.

183. Brooklyn Botanic Garden Contributions.

Papers originally published in periodicals, reissued as "separates" without change of paging and numbered consecutively. Established, April 1, 1911.

184. Brooklyn Botanic Garden Leaflets.

The purpose of the Leaflets is to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Established, April 10, 1913.

185. Brooklyn Botanic Garden Memoirs.

Published irregularly. Established, July, 1918.

186. Brooklyn Botanic Garden Record.

An administrative periodical, issued quarterly, and containing, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Established, January, 1912.

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9-6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

64. Inheritance of resistance to loose and covered smut in hybrids of Hull-less with Early Gothland and Monarch oats. 28 pages. 1932.

65. Monographic studies in the genus Eleocharis—II. 34 pages. 1932.

66. Inheritance of resistance to loose and covered smut in hybrids of Black Mesdag with Hull-less, Silvermine, and Early Champion oats. 14 pages. 1934.

67. Inheritance of resistance to loose smut and covered smut in some oat hybrids. 11 pages. 1934.

68. Monographic Studies in Eleocharis—III. 13 pages. 1934.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 5. The Rock Garden. 28 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 53 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

BROOKLYN BOTANIC GARDEN RECORD

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ADVANTAGES OFFERED TO MEMBERS AND TO
THE GENERAL PUBLIC

1935-36

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BROOKLYN BOTANIC GARDEN

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SCIENTIFIC AND EDUCATIONAL

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BROOKLYN BOTANIC GARDEN RECORD

EDITED BY

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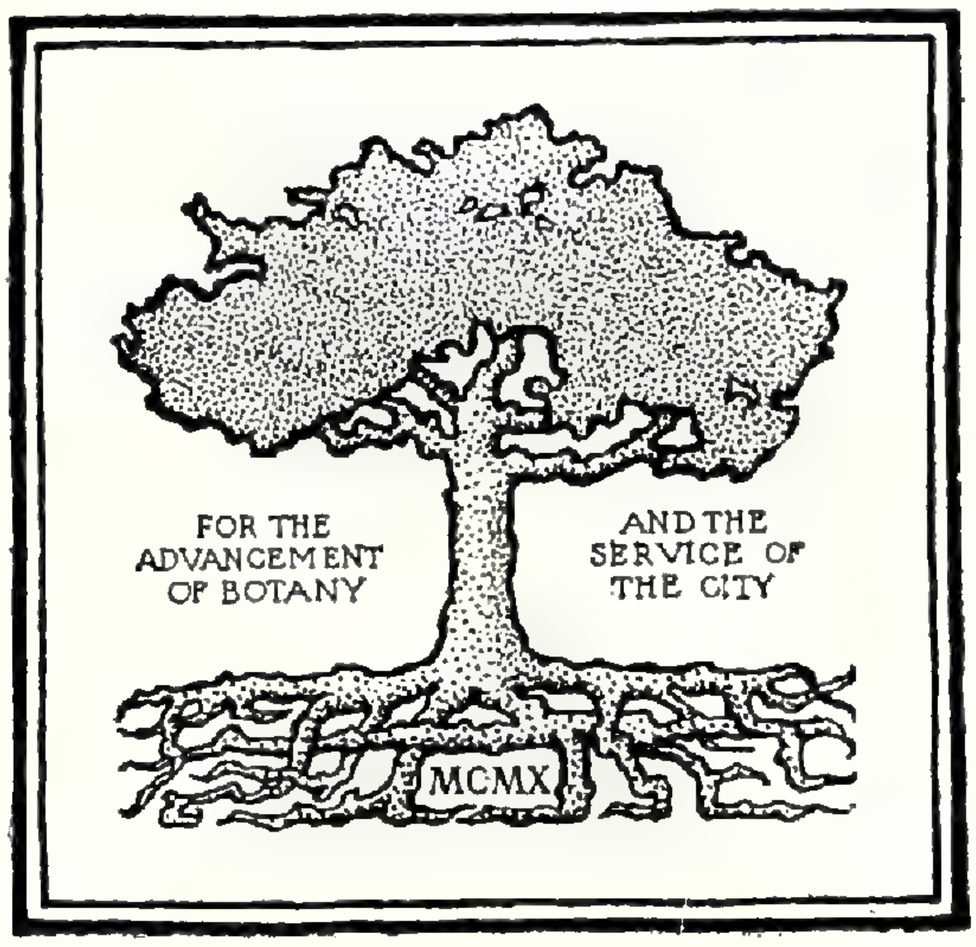

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INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1.	Annual member	$ 10
2.	Sustaining member	25
3.	Life member	500
4.	Permanent member	2,500
5.	Donor	10,000
6.	Patron	25,000
7.	Benefactor	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to seven carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, Prospect 9–6173.

PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party (of not less than six), when visiting the Garden.
4. Admission of member and one guest to field trips and other scientific meetings under Garden auspices, at the Garden or elsewhere.
5. Free tuition in most courses of instruction; in other courses a liberal discount from the fee charged to non-members.
6. Invitations for self and friends to spring and fall "Flower Days," and to the Annual Spring Inspection.
7. Copies of Garden publications, as follows:
   a. RECORD (including the ANNUAL REPORT).
   b. GUIDES (to the Plantations and Collections).
   c. LEAFLETS (of popular information).
   d. CONTRIBUTIONS (on request. Technical papers).
8. Announcement Cards (Post Card Bulletins) concerning plants in flower and other items of interest.
9. Privileges of the Library and of the Herbarium.
10. Expert advice on the choice and care of ornamental trees, shrubs, and herbaceous plants, indoors and out; on planting the home grounds; the care of lawns; and the treatment of plants affected by insect and fungous pests.
11. Determination of botanical specimens.
12. Participation in the periodical distribution of surplus plant material and seeds, in accordance with special announcements sent to members from time to time.
13. Membership privileges in other botanic gardens and museums outside of Greater New York, when visiting other cities and on presentation of membership card in Brooklyn Botanic Garden.

OUT–OF–TOWN MEMBERSHIP PRIVILEGES

In accordance with a cooperative arrangement with a number of other institutions and organizations, Brooklyn Botanic Garden members, when visiting other cities, may, on presentation of their Botanic Garden membership card at the office of the cooperating museum or organization, be accorded, without charge, the same privileges as are enjoyed by the members of that institution, including admission to exhibits and lectures, and invitation to social events. This does not include being enrolled on the mailing list for publications, and does not include free admission to the Philadelphia and Boston spring Flower Shows.

In reciprocation, the members of the cooperating units, when visiting the Metropolitan district of Greater New York, will be accorded full membership privileges at the Brooklyn Botanic Garden.

The cooperating units, as of October, 1935, are as follows:

Academy of Natural Sciences, Philadelphia, Pa.
Berkshire Museum, Springfield, Mass.
Boston Society of Natural History, Boston, Mass.
Buffalo Museum of Science, Buffalo, N. Y.
California Academy of Sciences, San Francisco.
Carnegie Museum, Pittsburgh, Pa.
Charleston Museum, Charleston, S. C.
Everhart Museum of Natural History, Science and Art, Scranton, Pa.
Fairbanks Museum of Natural Science, St. Johnsbury, Vt.
Field Museum of Natural History, Chicago, Ill.
Los Angeles Museum, Los Angeles, Calif.
Massachusetts Horticultural Society, Boston, Mass.
Missouri Botanical Garden, St. Louis, Mo.
Newark Museum, Newark, N. J.
New York State Museum, Albany, N. Y.
Peabody Museum of Archaeology and Ethnology, Cambridge, Mass.
Pennsylvania Horticultural Society, Philadelphia, Pa.
Philadelphia Commercial Museum, Philadelphia, Pa.
Southwest Museum, Los Angeles, California.

REGULATIONS CONCERNING PHOTOGRAPHING, PAINTING, AND SKETCHING

1. No permit is required for photographing with a hand camera, or for sketching or painting without an easel on the Grounds or in the Conservatories.

2. Sketching and painting with an easel and the use of a tripod camera are not allowed in the Japanese Garden, the Rose Garden, the Local Flora Section (Native Wild Flower Garden), nor the Conservatories at any time without a permit. No permits are given for use after 12 o'clock noon on Sundays and holidays.

3. Artists, and the public in general, may not bring into the Botanic Garden chairs, stools, or anything to sit in or on.

4. Holders of permits must not set up tripod cameras nor easels in such a way as to involve injury to living plants or lawns, nor to cause an obstruction to traffic on congested paths or walks.

5. Application for permits should be made at the office of the Director, Laboratory Building, Room 301, or by mail (1000 Washington Avenue), or by telephone (PRospect 9–6173).

GENERAL INFORMATION CONCERNING THE ACTIVITIES OF THE BROOKLYN BOTANIC GARDEN

The Brooklyn Botanic Garden, established in 1910, is a department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, special contributions, and tuitions. Its articulation with the City is through the Department of Parks.

By an Agreement with the City of New York, the functions of the Garden have been defined as two-fold: first, the advancement of botanical science through original research; and second, the dissemination of a knowledge of plants.

The first of these activities is carried on by director, curators, resident investigators, fellows, and others, who devote all or a part of their time to independent investigation. At present these investigations include studies in genetics, plant pathology, systematic botany, anatomy, physiology, economic botany, and horticulture.

The second function of the Garden, namely, the dissemination of botanical knowledge, is accomplished in the following ways:

I. By the teaching of classes—
   - (*a*) of adults who are interested in some phase of pure or applied botany, or of horticulture;
   - (*b*) of teachers of botany, biology, and nature study, who come for special courses on the subject matter or teaching methods of their subjects;
   - (*c*) of children who come voluntarily outside of school hours;
   - (*d*) of children who come with their teachers from public and private schools for special lessons on plant life and closely related subjects.

II. By lectures at schools, garden clubs, and elsewhere by staff members.

III. By broadcasting.

IV. By loan sets of lantern slides accompanied by lecture text, for use in the schools.

V. By the distribution to schools of study material for classes in botany, biology, and nature study.

VI. By public lectures and educational motion pictures at the Botanic Garden.

VII. By maintaining labelled collections of living plants, arranged systematically, ecologically, and otherwise on the grounds and in the Conservatories of the Garden.

VIII. By the herbarium, containing specimens of preserved plants from all parts of the world.

IX. By maintaining a reference library on plant life and related subjects, open free to the public daily (except Sundays and holidays).

X. By the following periodicals and publications issued by the Botanic Garden:

1. American Journal of Botany (Monthly, except August and September).
2. Ecology (Quarterly).
3. Genetics (Bimonthly).
4. Brooklyn Botanic Garden Record, including Annual Report and Guides (Quarterly).
5. Leaflets (Weekly or biweekly in Spring and Fall).
6. Contributions (Irregular).
7. Memoirs (Irregular).
8. Miscellaneous:

Syllabi of lectures.
Guide sheets for classes.
Announcement cards and circulars.
Bibliographies.
Miscellaneous books and booklets.

XI. By popular and technical articles in journals and the public press, including regular "News Releases" concerning Botanic Garden activities and events.

XII. By the maintenance of a Bureau of Public Information on all phases of plant life.

XIII. By providing docents to accompany members and others who wish to view the collections under guidance.

XIV. By the installation of botanical and horticultural exhibits at

the Garden, the International Flower Show, and elsewhere.

XV. By cooperating with New York City Departments (e.g., Board of Education, Board of Higher Education, Department of Parks, Board of Health, and the Municipal Broadcasting Station—WNYC) and other agencies, in the dissemination of botanical knowledge.

The Brooklyn Botanic Garden is also taking an active part in the nation-wide movement for Scenic Preservation and legislation for the conservation of our native American plants.

A brief summary and report of the public educational work of the Garden from 1910 to 1928, with some attempt to set forth the fundamental principles upon which it is based, was published in the Brooklyn Botanic Garden RECORD for July, 1929. This is now out of print, but may be found on file at most of the larger libraries of the country.

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Plantations, comprising Systematic Section, Local Flora Section, Japanese Garden, Rock Garden, Rose Garden, and various Horticultural Displays. Flower Days. Conservatories, Herbarium, Library, Laboratory Building, Instructional Greenhouses, Children's Room, Children's Building, Children's Garden, Shakespeare Garden, Meridian Panel, Armillary Sphere, Labelled Boulders, Etc.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXIV OCTOBER, 1935 NO. 4

PROSPECTUS: 1935–36

I. COOPERATION WITH LOCAL SCHOOLS

The Brooklyn Botanic Garden aims to cooperate in every practicable way with the public and private schools of Greater New York in all matters pertaining to the study of plants and closely related subjects. The purpose of the Garden in this connection is to supplement and enrich the school work in the way of instruction, demonstration methods, study material, etc., which otherwise would not be available.

Geography classes, as well as classes in nature study and botany, find the collection of useful plants in the economic plant house, the Local Flora Section, the Japanese Garden, and also the Meridian Panel, the Armillary Sphere, and the Labelled Boulders, valuable adjuncts to their class work. Arrangements may be made by teachers of geography to have their classes study these collections under guidance. Illustrated lectures for geography classes may also be arranged for at the Garden.

To visiting college classes in geology and physiography the Botanic Garden offers interesting material for a study of glaciation. Notable features are a portion of the Harbor Hill terminal moraine (Boulder Hill), the morainal pond (the "Lake"), the labelled glacial boulders, and the Flatbush outwash plain. See Guide No. 7, *"The Story of our Boulders: Glacial Geology of the Brooklyn Botanic Garden."* See also pages 222–224 for statements concerning the Labeled Glacial Boulders, the Meridian Panel, and the Armillary Sphere.

A. Talks at Elementary Schools.—The principals of public or private elementary schools may arrange to have talks given at

the schools on various topics related to plant life, such as school gardens and garden work with children, tree planting, the conservation of wild flowers, Arbor Day, etc. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Address the *Curator of Elementary Instruction* for a list of talks and for appointments.

B. Talks at Secondary Schools and Colleges.—Informal illustrated talks on various subjects of an advanced botanical nature have been given for many years at Secondary Schools and Colleges by members of the staff. Arrangements for such talks should be made with the *Curator of Public Instruction.*

C. School Classes at the Garden.—(*a*) Public or private schools may arrange for classes, accompanied by their teachers, to come to the Botanic Garden for illustrated lectures either by the teacher or by a member of the Garden Staff.

(*b*) Notice of such a visit should be sent at least *one week* previous to the date on which a talk is desired. Blank forms are provided by the Garden for this purpose. These talks will be illustrated by lantern slides, and by the conservatory collection of useful plants from the tropics and subtropics. Fall and spring announcements of topics will be issued during 1935–36.

(*c*) The Garden equipment, including plant material, lecture rooms, lantern, and slides, is at the disposal of teachers who desire to instruct their own classes at the Garden. Arrangements must be made in advance so that such work will not conflict with other classes and lectures. For High School and College classes address the *Curator of Public Instruction.* For Junior High and Elementary School classes address the *Curator of Elementary Instruction.*

(*d*) The principal of any elementary or high school in Brooklyn may arrange also for a series of six lessons on plant culture to be given to a class during the fall or spring. A small fee is charged to cover the cost of the materials used. The plants raised become the property of the pupils. The lessons will be worked out for the most part in the greenhouse, and the class must be accompanied by its teacher. This is adapted for pupils above the third grade.

D. Seeds for School and Home Planting.—Penny packets of seeds are put up by the Botanic Garden for children's use. In

1935 more than 1,000,000 packets were distributed. In the early spring, lists of these seeds, order blanks for teachers and pupils, and other information may be secured on application to the *Curator of Elementary Instruction.*

E. Conferences.—Conferences may be arranged by teachers and principals for the discussion of problems in connection with gardening and nature study. Appointments must be made in advance. Address the *Curator of Elementary Instruction.*

F. Study and Loan Material.—To the extent of its facilities, the Botanic Garden will provide, on request, various plants and plant parts for study; also certain protozoa and sterilized nutrient agar. When containers are necessary, as in the case of agar, algae, and protozoa, they must be furnished by the school.

In the past, the Garden has offered this service gratis, but both on account of the increasing demand and because of the decrease in appropriations, it has become necessary to make a small charge for the material supplied or loaned. This charge will be made only for material furnished to junior high schools, high schools, and colleges. As far as possible, material will continue to be supplied gratis to elementary schools in case one or more of their teachers are members of regular Botanic Garden classes. A Price List of the various materials furnished will be mailed on request.

Requests for high school and college material should be made by mail or telephone (PRospect 9–6173), **at least a day in advance,** to the School Service Assistant. Requests for elementary school material should be made to Miss Elsie T. Hammond, and should be called for at the Information Booth on the ground floor. High school and college material should be called for at Room 327.

Material Usually Available

1. Algae:
   - Pleurococcus
   - Spirogyra
   - Vaucheria
   - Desmids
   - Blue-green algae: Oscillatoria and others.
2. Fungi:
   - Forms of fungi and lichens.
   - Plus and minus strains of bread mold.

Smut of oats or wheat.
Black stem rust of wheat.

3. Liverworts: Conocephalum and Lunularia.
4. Moss plants: protonema "felt," and capsules.
5. Ferns:
   Prothallia: for these a covered Petri dish or tin box should be sent.
   Fronds with spores.
6. Selaginella with sporophylls.
7. Elodea—to show movement of protoplasm.
8. Corn or sorghum stems, dried.
9. Twigs to show opposite or alternate arrangement of buds.
10. Simple and compound leaves.
11. Various seeds and fruits to illustrate methods of dispersal.
12. Material for the study of genetics:
    Pods of Jimson weed showing inheritance of both smooth and spiny pods.
    Sorghum seeds for demonstrating inheritance of red seedling color.
    Pea seeds to show Mendelian seed and seedling characters.
13. Sensitive plants (*Mimosa pudica*).
14. Protozoa: Paramoecium, Euglena, and others.
15. Fruit flies (*Drosophila*), wild type and mutants, transferred to bottles of culture medium supplied by applicant.

Specimens Loaned for Exhibit.

16. Leguminous roots with tubercles.
17. Riker mounts of powdery mildew, rusts and smuts, maple tar spot.
18. Riker mounts of peas showing inheritance of seed characters.
19. Oats showing inheritance of hull color.
20. Corn showing inheritance of endosperm colors.
21. Sorghum varieties and the F_1 hybrid.
22. Types of cereals: wheat, oats, barley, rye, rice, corn.
23. Eight types of wheat.
24. Eight types of barley.
25. Riker mounts of types of modified leaves.

26. Geranium, Coleus, Tradescantia—variegated green and white, for photosynthesis experiment.

Sterilized Agar

27. Petri dishes sent in *clean and dry* ten days in advance, or test tubes or flasks sent in one week in advance, will be filled with sterilized nutrient agar for the study of bacteria and molds.

G. Demonstration Experiments.—Teachers may arrange to have various physiological experiments or demonstrations conducted at the Garden for the benefit of their classes. Communications in regard to these matters should be addressed to the *Curator of Public Instruction.*

H. Loan Sets of Lantern Slides.—Sets of lantern slides have been prepared for loan to the schools. Each set is accompanied by a short lecture text of explanatory nature. In all cases these sets must be called for by a responsible school messenger and returned promptly in good condition. Address, by mail or telephone, Mr. Frank Stoll. The subjects now available are as follows. Other sets are in preparation.

1. Plant Life
2. Spring Wild Flowers
3. Common Trees
4. Fall Wild Flowers
5. Forestry
6. Conservation of Native Plants

II. BUREAU OF PUBLIC INFORMATION

Consultation and advice, and the facilities of the library and herbarium are freely at the service of members * of the Botanic Garden and (to a limited extent) of others with special problems relating to plants or plant products, especially in the following subjects:

1. Plant diseases and determination (naming) of fungi.
2. Plant geography and ecology.
3. Determination of flowering plants.
4. The growing of cultivated plants and their arrangement; also their adaptation to soils, climate, and other factors.
5. The care of trees, shrubs, and lawns, and general gardening problems.

* For information about membership consult pages v–vii of this PROSPECTUS.

Inquiries should be directed to the *Curator of Public Instruction,* preferably by letter.

Determination of Specimens.—If the identification of plants is desired, the material submitted should include flowers, and fruit when obtainable. Identification of a single leaf is often impossible. For identification of plant diseases, representative portions of the part diseased should be sent.

III. DOCENTRY

To assist members and others in studying the collections, the services of a docent may be obtained. Arrangements should be made by application to the *Curator of Public Instruction* one week in advance. No parties of less than six adults will be conducted. This service is free of charge to members; to others there is a charge of 50 cents per person. For information concerning membership in the Botanic Garden see pages v–vii of this PROSPECTUS.

IV. COURSES OF INSTRUCTION

Except courses A23 and A29, each of the courses here announced is a unit and not a series of unrelated lectures. Students must enroll for an *entire course.* With the exceptions noted, no registrations will be made for separate class exercises.

Courses of instruction are offered in Botany, Horticulture, and Nature Study, and are divided into four classes:

A. For members and the general public (" A " courses, p. 201)
B. For teachers (" B " courses, p. 205)
C. For children (" C " courses, p. 208)
D. Other courses of a special nature (" D " courses, p. 209)
E. Research courses (" E " courses, p. 209)

No course will be given when less than ten persons apply for registration. Since registration in many of the courses is restricted to a fixed number on account of the limited space available in the greenhouses, and for other reasons, those desiring to attend are urged to send in their application for enrollment and the entrance fee to the Secretary, Brooklyn Botanic Garden, several days in advance of the first exercise. This avoids delay at the beginning of the first exercise, ensures a place in the course, and enables the instructor to provide adequate material for the class.

Field Excursions.—When courses of instruction involve field excursions, these excursions are open only to those who have enrolled for the entire course.

Enrollment.—Persons are requested not to register in any course unless they are reasonably confident that they can attend the sessions of the class regularly and throughout. This is especially important where the number to be enrolled is limited. To register and not attend will quite certainly deprive someone else of the privilege of attending.

Equipment available for the courses:

1. Three *Classrooms* (in addition to the Boys' and Girls' Club Room in the Laboratory Building), equipped with stereoscopes and views, a stereopticon, plant collections, economic exhibits, models, and other apparatus and materials for instruction.

2. Two *Laboratory Rooms,* with the usual equipment for plant study.

3. Three *Instructional Greenhouses,* for the use of juvenile as well as adult classes, for instruction in plant propagation and related subjects.

4. The *Children's Garden,* on a piece of land about three-quarters of an acre in extent, in the southeast part of the Botanic Garden, divided into about 150 plots which are used throughout the season for practical individual instruction in gardening.

5. *The Children's Building,* near the north end of this plot, containing rooms for conferences and for the storage of tools, seeds, notebooks, special collections, etc.

6. *The Auditorium,* on the ground floor, capable of seating 570 persons, and equipped with a motion-picture machine and stereopticon, and electric current, gas, and running water for experiments connected with lectures.

In addition to these accommodations, the dried plant specimens in the herbarium, the living plants in the conservatories and plantations, and the various types of gardens, are readily accessible; while the main library and children's library, which contain a comprehensive collection of books on every phase of gardening and plant life, may be consulted freely at any time. See also pages 214–222.

A. Courses for Members and the General Public

Although the following courses are designed especially for Members of the Botanic Garden, they are open (unless otherwise

specified) to any one who has a general interest in plants. Teachers are welcome. Starred courses (*) are open also for credit to students of Long Island University, and are described in the current Long Island University catalog. In harmony with an agreement entered into in the spring of 1935, the Botanic Garden, upon recommendation of the Chairman of the Biology Department of Long Island University, offers a course scholarship to one student of the University.

Unless otherwise specified, all "A" courses are *free to members,*† but the individual class exercises are open only to those who register for the entire course. Of others a fee is required, as indicated. In courses where plants are raised, these become the property of the class members.

A1. Plants in the Home: How to Grow Them.—Five talks with demonstrations. This course deals with the principles to be followed in raising plants. Practice in potting, mixing soils, making cuttings, etc. The members of the class have the privilege of keeping the plants they have raised. *On account of restricted space in the greenhouse, this class must be limited to 40. Registration according to the order of application. Fee to non-members, $6 (including laboratory fee); to members, $1 laboratory fee. Wednesdays, 11 a.m., November 6 to December 11. (Omitting November 27.)*

Mr. Free.

***A5. Trees and Shrubs of Greater New York: Fall Course.**—Ten outdoor lessons in the parks and woodlands of Greater New York on the characteristics of our common trees and shrubs, both native and cultivated, emphasizing their distinguishing features in the winter condition. *Fee, $5. Saturdays, 2:30 p.m., September 28 to December 14. (Omitting October 12 and November 30.)* The first session will be held at the Brooklyn Botanic Garden.

Dr. Graves and Miss Vilkomerson.

***A9. Trees and Shrubs of Greater New York: Spring Course.**—Ten outdoor lessons in the parks and woodlands of Greater New York. Similar to the preceding, except that the different species are studied in their spring and summer conditions.

* Accepted for credit in Long Island University.

† For information concerning membership in the Brooklyn Botanic Garden consult pages v–vii.

Fee, $5. Saturdays, 2:30 p.m., April 4 to June 20. (Omitting April 11 and May 30.) Dr. Graves and Miss Vilkomerson.

A11. Flowering Plants and Ferns of the New York Region: Spring Course.—Six sessions, in the Brooklyn Botanic Garden and in the woodlands near the City, for field identification of spring flowers and ferns. *Fee, $3. Saturdays, 9:30 a.m., April 25 to June 13. (Omitting May 16 and 30.)* Miss Rusk.

A13. Flowering Plants and Ferns of the New York Region: Fall Course.—Five sessions. Field identification of the common plants of wood and roadsides, including identification of seeds and fruits. *Fee, $2.50. Saturdays, 9:30 a.m., September 14 to October 26. (Omitting September 21 and October 12.)* The first meeting will be held at Englewood Cliffs, N. J. Miss Rusk.

A20. Advanced Course in Gardening.—Ten lessons. This course presupposes a knowledge of the elements of gardening equivalent to that contained in courses **A1** and **A25.** It consists of lectures illustrated with lantern slides and living material, and includes frequent tours in the Brooklyn Botanic Garden where the various types of gardens and other subjects of the lectures are demonstrated. *(Not offered in 1936.)* Mr. Free and Dr. Reed.

A23. Flower Arrangement. Sponsored by the Woman's Auxiliary. Five sessions. In cooperation with the Metropolitan Museum of Art. The principles of effective flower arrangement, the importance of color, and the choice of containers will be discussed and demonstrated by prominent guest speakers. A demonstration of effective backgrounds for flower arrangements will be given at the Museum for one of the sessions. The guest speakers include Mrs. William H. Cary, Miss Grace Cornell of the Metropolitan Museum, Mrs. Roy M. Lincoln, and Miss Hazel Heissenbuttle. This course is free to members of the Botanic Garden and the Metropolitan Museum. *Fee to non-members $6. Single lectures $1.25. Wednesdays at 11:00 a.m., January 8 to February 5.* For further information address Mrs. Whitney Merrill.

A25. Fundamentals of Gardening.—A course in first principles, for those who desire to carry on practical work in their own gardens and to start seedlings in the greenhouse. The lessons are as follows:

Making cuttings of plants for use in the outdoor garden.
Planting seed in the greenhouse.
Planning the garden.
Pricking out seedlings in the greenhouse.
The garden soil.
Outdoor lesson.

Class limited to 60 members. Fee to non-members, $7 (including laboratory fee); to members, $2 laboratory fee. Wednesdays, 10:30 a.m., March 11 to April 15. Miss Shaw and Assistant.

A29. Practical Gardening.—An evening course for men and women. Five talks with demonstrations. Subjects discussed are: Soil management; planting; pruning; combatting plant pests; plant propagation, including budding and grafting. At the close of each session the class will be afforded an opportunity to bring up special garden problems for discussion. *Fee, $4; single lecture, $1. Monday evenings, 8 p.m., February 3 to March 2.* Mr. Free.

***A30. Ornamental Shrubs: Spring Course.**—Ten outdoor sessions held on the grounds of the Brooklyn Botanic Garden, dealing with the shrubs used in ornamental planting. More than two hundred species and varieties of shrubs are studied at the time of flowering. *Class limited to 25 members, enrolled in order of application. Fee, $5. Wednesdays, 4 p.m., April 15 to June 17.*
Mr. Doney.

***A31. Ornamental Shrubs: Fall Course.**—Ten sessions, about eight of which are held outdoors in the Brooklyn Botanic Garden, for the purpose of becoming acquainted with the common species and varieties of cultivated shrubs. Fall flowers and fruits of ornamental shrubs and small trees, also evergreen shrubs, are studied. This is a continuation of the spring course. *Class limited to 25 members, enrolled in order of application. Fee, $5. Wednesdays, 4:15–5:30 p.m., October 2 to December 4.*
Mr. Doney.

***A32. Plant Families: Spring Course.**—Ten outdoor sessions in the Brooklyn Botanic Garden. This course treats of the structure and possible lines of evolution of flowers, and the characteristics of important families of flowering plants, such as the Magnolia, Buttercup, Rose, Pea, Mustard, Pink, Geranium, Mal-

low, Carrot, Heath, Potato, Figwort, Mint, Honeysuckle Composite, and Lily Families. (*Not offered in 1936.*)

Dr. Gundersen.

***A33. Plant Families: Fall Course.**—Eight sessions, six outdoors in the Botanic Garden, in continuation of the spring course (A32), for a study of the fall flowers and fruits and the vegetative characters of the different families of flowering plants. The two last exercises are illustrated lectures on plant-animal interdependence in evolution. *Fee, $4. Wednesdays, 4 p.m., September 25 to November 13.* Dr. Gundersen.

A36. Junior Garden Work.—A course planned primarily for members of garden clubs and women's clubs desirous of starting children's junior garden work. Four lessons as follows:

Preparation for outdoor garden work.
Garden plans for young people.
Starting plants indoors.
How to lay out the garden.
How to plant.
General management of children's garden work.

Fee, $2, to cover cost of materials. Thursdays, 10:30 a.m., February 20 to March 12. Miss Shaw and Miss Miner.

A37. Lilacs.—Four outdoor lessons on the grounds of the Botanic Garden. About one hundred varieties and fifteen species will be studied at their time of flowering. *Fee, $2. Thursdays, 10:30–11:45 a.m., May 7 to May 28.* Dr. Gundersen.

B. Courses for Teachers: Given in Cooperation with the Brooklyn Teachers Association

These courses have been accepted by the Brooklyn Teachers Association, and appear in its Syllabus of Courses. On satisfactory completion of each course, the student is awarded a certificate by the Brooklyn Teachers Association, in cooperation with the Brooklyn Botanic Garden. The courses are also accepted by the New York Board of Education for credit toward higher teaching licenses, one credit being granted for each 15 hours (with the exception of "B8, Plant Culture"). Through an agreement with Long Island University, undergraduate credit for certain courses

will be allowed toward fulfilling the requirements for a university degree, provided the admission requirements at the University and the laboratory requirements have been fulfilled. Such courses are starred (*). By special arrangement with the institution concerned, these credits have also been used as undergraduate credits in other colleges and universities. Nature materials used in the courses, and plants raised become the property of the student.

Members of the Garden are entitled to a 50 per cent. discount from the regular fee for all "B" courses; from other persons the indicated fee is required. Long Island University students desirous of electing any of these or of the "A" courses should notify Dean Tristram W. Metcalfe or Dr. Ralph H. Cheney, who will give the candidate a card entitling him to admission to the course. The student should present this card at the beginning of the first session of the course. *No course will be given when less than ten persons apply.*

B1. General Botany.—A two-year course of thirty class meetings and thirty two-hour laboratory periods each year. The first year (A) is spent on the structure and functions of the higher plants. The second year (B) deals with the structure, life histories, and relationships of the lower groups: bacteria, algae, fungi, lichens, mosses, and ferns. Four credits each year. In 1935–36 the second half (B) will be given. The first half is not a prerequisite for the second. *Fee, $10 each year. Tuesdays, 4 p.m., beginning September 17, and Fridays, 4–6 p.m., beginning September 20.* Miss Rusk.

B2 (a). Nature Study.—A thirty-hour course in fifteen two-hour sessions, including field work. This course is based on the New York City Syllabus on Nature Study for the elementary grades, and is planned to acquaint the student with botanical nature material, and to be of specific help in setting up nature rooms and planning lessons. Two credits. *Fee, $10. Tuesdays, 4–6 p.m., beginning September 24.* Miss Hammond and Miss Miner.

B2 (b). Nature Study.—A spring course similar to B2 (a). Miss Farida Wiley, of the American Museum of Natural History, will conduct a field lesson on bird study on a date to be announced. Two credits. *Fee, $10. Tuesdays, 4–6 p.m., beginning February 18.* Miss Hammond and Miss Miner.

B3. Principles of Horticulture.—Thirty sessions. *For teachers only.* Lessons in potting and general care of house plants; methods of plant propagation, including the planting of bulbs; making cuttings (soft wood, and leaf); sowing seeds; preparing for the outdoor garden. Most of this work is carried on in the greenhouses. Emphasis will be laid on problems of a practical nature. Two credits. *Fee, $10. Wednesdays, 4 p.m., beginning September 25.* Miss Shaw and Assistant.

B7. Greenhouse Work.—Thirty sessions. *For teachers only.* A continuation of Principles of Horticulture and open to students who have taken **B3.** Further study of plant-propagation methods: arrangement of plants in hanging baskets, window boxes, dishes, etc.; special culture of certain house plants and winter-flowering greenhouse plants. Mr. L. Gordon Utter will give four lectures, with demonstrations and practical work in methods and results of plant breeding. Two credits. *Fee, $10. Tuesdays, 4 p.m., beginning September 24.* Miss Shaw.

B8. Plant Culture.—A course of twenty weeks duration for those who have taken **B3** and **B7.** Work entirely in the greenhouse. No Board of Education credits are given for this course. *Fee, $10. Thursdays, 4 p.m., beginning October 17.* Miss Shaw.

***B10. Flowering Plants: Field and Laboratory Study.**—Thirty sessions. The object of this course is to become acquainted with species of wild flowering plants (including weeds), and to learn how to identify them. Field and laboratory work are distributed according to the weather, the season, and the needs of the class. The field work is done largely in the Brooklyn Botanic Garden. The laboratory work consists of examining flowering plants and identifying them by means of a key, and of pressing, drying, and mounting plants for permanent specimens. Prerequisite: an elementary course in botany. Two credits. *Fee, $10. Wednesdays, 4–6 p.m., beginning September 11.* Miss Rusk.

***B13–14. Trees and Shrubs of Greater New York.**—Twenty two-hour sessions. A course of outdoor lessons in the parks and woodlands of Greater New York, the principal object being to gain a ready acquaintance with the common trees and shrubs of the eastern United States, which are well represented in this region. The species are considered in systematic order, in both winter and

summer conditions, and the features pointed out by which they may most easily be recognized. Two credits. This course is the same as **A5** and **A9,** and is therefore *free to members of the Garden. Fee to non-members, $10. Saturdays, 2:30 p.m., September 28 to December 14;* and *April 4 to June 20. (Omitting October 12, November 30, April 11, and May 30.)*

Dr. Graves and Miss Vilkomerson.

***B15–16. Economic Plants.**—Thirty sessions. The most important economic plants of the world are considered—their history, culture, formation of their useful products, and the extraction and preparation of the latter by man. Herbarium specimens and other material, as well as living plants in the conservatories and plantations of the Garden will be used for demonstrations. Because of its practical applications, this course will be of special value to teachers. Two credits. *Fee, $10. Mondays, 4 p.m., beginning October 7.*

Dr. Cheney.

B17. Genetics.—Thirty class meetings and fifteen 2-hour laboratory periods. An introductory course in heredity and variation, including discussion of Mendelian principles, the physical basis of heredity, sex linkage, factor linkage, factor interaction, and quantitative inheritance. Laboratory work on plant material and *Drosophila.* Prerequisite: an elementary course in botany. Three credits. *Fee, $10. Mondays, 4 p.m., beginning September 16;* and *Thursdays, 4–6 p.m. (laboratory), beginning in December or January.*

Miss Rusk.

C. Children's Courses

Saturday morning classes for boys and girls are open to children from eight to nineteen years old. Children are grouped in these classes according to age and experience.

Miss Shaw and Assistants.

I. The Fall Course takes up nature study on the grounds; plant propagation in the greenhouses, using stem and leaf cuttings; bulbs and corms; making of terrariums and dish gardens. Enrollment limited to 175 children. *Fee, ten cents. Saturday mornings, 9–11:15, October 19 to December 21.*

II. Winter Course.—Children who have shown unusual ability are chosen from the fall group for winter work. Introduction

to the observation of plants through the microscope; propagation projects; study of economic plants; plans for summer flower borders, involving a liberal use of the Children's Library; flower games, etc. Group limited to 50. *No fee. Saturday mornings, 9–11:15, February 1 to March 7.*

III. Spring Course.—Nature study and preparation for the outdoor garden, including studies of seed germination, seed sowing in the greenhouse, and the making of garden plans. All candidates for the outdoor garden must be in spring classes. Enrollment limited to 200. *Fee, ten cents. Saturday mornings, 9–11:15, March 14 to April 18.*

IV. Summer Garden Course.—The outdoor garden is open throughout the summer season, and hours arranged to fit in with children's vacation schedules. No child is assigned an outdoor garden who has not had the spring preparatory work. Group limited to 200 children. *Fee, twenty-five or thirty-five cents,* depending on the size of the garden. The garden session begins *April 25.* The head garden teacher is Miss Miner.

D. Course for Student Nurses

D1. General Botany With Special Reference to Medicinal Plants.—A course of 10 spring and 10 fall lectures, demonstrations, and field trips for student nurses. Arranged in cooperation with various hospitals. The general principles governing the life of plants, as well as the use and care of flowers and potted plants in the sick room, will be considered. Special attention will be paid to the identification of officinal plants in the field. Hours to be arranged. *No fee.* Dr. Graves.

E. Investigation

1. *Graduate Work for University Credit*

By the terms of a cooperative agreement between New York University and the Brooklyn Botanic Garden, properly qualified graduate students may arrange to carry on independent investigations in botany at the Garden under the direction of members of the Garden Staff, who are also officers of instruction in the Graduate School of the University. The advantages of the library,

laboratories, herbarium, and collections of living plants at the Garden are freely at the disposal of students registered at New York University for such work. Such properly enrolled graduate students are charged no additional fees by the Garden. The following courses are approved by the faculty of the Graduate School of New York University and are given credit as full courses:

E6. Research in Mycology and Plant Pathology.—Investigation of problems relating to fungi and fungous diseases of plants. Dr. Reed.

E8. Research in Forest Pathology.—Investigation of the diseases of woody plants. Dr. Graves.

E9. Research in the Structure of Flowers. Dr. Gundersen.

E10. Research in the Systematic Botany of the Flowering Plants. Dr. Svenson.

2. Independent Investigation

The facilities of the laboratories, conservatories, library, and herbarium are available to qualified investigators who wish to carry on independent researches in their chosen field. There is a charge of $25 per year, payable to the Botanic Garden.

V

MISCELLANEOUS

Press Releases

In order to keep the public informed of events at the Garden news items are sent at fairly regular and frequent intervals to the metropolitan dailies and to many of the suburban papers. These news releases consist of announcements of the periods when the principal floral displays are at their best, of the acquisition of new plants, the blossoming of rare species, improvements in the plantations, the installation of new collections and exhibits, the results of research and exploration, etc. The beginnings of the various public courses, as well as public lectures, meetings of various societies at the Garden, Flower Days, and social events are also announced through the public press.

Broadcasting

During 1934 members of the Garden personnel gave 46 radio talks on general botanical or horticultural topics and concerning the Brooklyn Botanic Garden, as follows: Over WOR, 15; WNYC, 31.

The talks over WOR were given in cooperation with the Cooperative Extension Work in Agriculture and Home Economics of the State of New Jersey. In connection with these talks a Radio Garden Club and a Junior Radio Garden Club have been organized. Bulletins are sent regularly to the members of these clubs, and a " fan " mail has developed as a bureau of information on horticultural topics.

Broadcasting, including the cooperation with the State of New Jersey, is being continued during 1935, and will be continued during 1936. Those interested should watch the daily paper announcements for talks on gardening and plant life.

Circulars of Information

Circulars descriptive of the various courses and lectures are distributed, without charge, to a regular mailing list which includes Brooklyn Botanic Garden officials and members, members of the Woman's Auxiliary, all the libraries and schools of Greater New York, registered and former students, and others. Requests to be placed on this mailing list should be addressed to the *Curator of Public Instruction.*

Popular Publications

Leaflets.—The publication of the Brooklyn Botanic Garden *Leaflets* commenced in 1913. Approximately ten numbers—sometimes more—constitute a Series, one series being issued each year. The current series is Number XXIII. At the end of every four years, for convenience in binding, a table of contents of the *Leaflets* published during the four year period is issued.

The purpose of the *Leaflets* is primarily to present popular information about plant life in general for teachers and others, and to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. The

Leaflets are free to members of the Garden and (on request) to teachers in the schools of Greater New York. For others, the subscription is 50 cents per year, or 5 cents a number (4 pages).

Besides the *Leaflets,* numerous popular articles on various phases of plant life and gardening are written by members of the staff for publication in periodicals and newspapers.

The Plant World.—By C. Stuart Gager. A popular introduction to the more interesting facts concerning the plant life of the earth, and the importance of plants in our daily lives. 136 pages; 79 illustrations. Price 75 cents. On sale at the Information Desk and Entrance Gates, and by mail.

A Teaching Guide to the Trees and Shrubs of Greater New York.—By Arthur H. Graves and Hester M. Rusk. A handbook used in Botanic Garden classes, of brief, non-technical descriptions of the woody plants of the Greater New York region, with the characters by which they may be recognized in summer or winter. Keys, a glossary, and index are appended. ix + 76 pages. Price 75 cents. On sale at the Information Desk and Entrance Gates, and by mail.

Illustrations of Flowering Plants of the Middle Atlantic and New England States.—By the late George T. Stevens, M.D. Edited by Alfred Gundersen. Contains 199 plates and index of about 1500 species of the commoner flowering plants, exclusive of the grasses and sedges. Reprinted primarily for use in Brooklyn Botanic Garden classes. Price $1.00. On sale at the Information Desk and Entrance Gates, and by mail.

Guide Books, Maps and Souvenir Postcards of the Garden

During the last few years, Guide Books have been published from time to time, as special numbers of the *Brooklyn Botanic Garden Record,* based upon and explaining various Botanic Garden features and exhibits.

Each of these publications is more than a guide to an exhibit; it is an elementary treatise on the general subject illustrated by the Garden feature or exhibit. In this way the Guides have value even for those who may not be able to visit the Botanic Garden. The following numbers have been published:

Guide No. 2. Gardens within a garden: A general guide to the grounds of the Brooklyn Botanic Garden. By C. Stuart Gager.

May, 1929. 36 pages, 16 illustrations and map. Price, 25 cents. Out of print.

Guide No. 3. The story of our metate: A chronicle of corn. By F. W. Hodge. November, 1929. 25 pages, 14 illustrations. Price, 25 cents.

Guide No. 4. The Japanese Garden of the Brooklyn Botanic Garden. By Bunkio Matsuki. July, 1930. 38 pages, 20 illustrations. Price, 35 cents; by mail, 40 cents. Out of print.

Guide No. 5. The Rock Garden of the Brooklyn Botanic Garden. By Montague Free. May, 1931. 55 pages, 28 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). By Bunkio Matsuki. November, 1931. 16 pages, 11 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. By C. Stuart Gager and Ernst Antevs. May, 1932. 43 pages, 22 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 8. The story of fossil plants. Guide to the eight transparencies in Conservatory House No. 2. By Edward W. Berry. July, 1932. 29 pages, 8 illustrations. Price, 35 cents; by mail, 40 cents.

These Guides are mailed free, as published, to members of the Garden. Additional copies at regular rates. Similar guides are in preparation and will be published from time to time.

Books and manuscripts illustrating the history of botany: An annotated list. By Emilie Perpall Chichester and C. Stuart Gager. July, 1935. 36 pages. Price, 40 cents. Based upon incunabula and other items in the Library of the Brooklyn Botanic Garden.

A detailed map of the Garden, showing not only the various types of gardens included in the Botanic Garden area, but especially the location of the various orders and families in the Systematic Section, is appended to the General Guide (Guide No. 2). Copies are on sale at 5 cents each.

A colored picture map of the Garden, 7½ x 3½ feet, designed and executed by Miss Helen Sewall, is on view in the Laboratory Building. This map was presented to the Garden at the Annual Spring Inspection, May 14, 1929, by members of the Woman's

Auxiliary and other friends, as a memorial to Dr. Glentworth Reeve Butler (1855–1926), and in grateful recognition of the services of Mrs. Butler, chairman of the Woman's Auxiliary, 1926–1932. Photographs of this map (in black and white, 6½ x 4¼ inches) may be had at 20 cents each.

Souvenir postcards, in colors, may be had at 10 cents a set (7 cards); three for 5 cents; 2 cents each. The subjects are: Scene in the Children's Garden; The Brook; Daffodils in the Lawn; The Lake; Children's Building and Formal Garden; The Rock Garden (Waterfall and Iris); The Japanese Garden (Wisteria); Inflorescence of Sago Palm (*Cycas revoluta*).

Orders for guide books, maps, and souvenir postcards, accompanied by remittance, should be sent to *The Secretary.* These articles may also be obtained at the Information Desk in the Laboratory Building, and at the Entrance Gates.

VI

OTHER EDUCATIONAL FEATURES

Plantations

The plantations comprise the following sections and gardens:

1. General Systematic Section (trees, shrubs, and herbaceous plants arranged according to orders and families).
2. Local Flora Section (Native Wild Flower Garden). Arrangement ecological.
3. Ecologic Garden. (Temporarily discontinued.)
4. Japanese Garden.
5. Rock Garden.
6. Rose Garden.
7. Iris Garden.
8. Water Gardens (Lake, Brook, Swamp, Bog, Pools).
9. Children's Garden.
10. Shakespeare Garden.
11. Horticultural Section, including a Wall Garden.
12. Conservatory Plaza (Water Lilies, Herbaceous Borders).
13. Laboratory Plaza (Magnolias).

14. Various horticultural collections, as for example:
    Flowering cherries, plums, apples, etc.
    Lilacs.
    Peonies.
    Azaleas and Rhododendrons.
    Iris (Bearded and Japanese).
    Cannas.
    Dahlias.
    Hardy Asters.
    Hardy Chrysanthemums.
15. Miscellaneous plantations.
    a. Naturalistic plantings of bulbs.
        Crocus, Daffodils, Poets Narcissus, etc.
    b. Decorative and screen plantings.
16. Experimental Garden (Test Garden for Beardless Iris; Plant Pathology and Plant Breeding Plots).
17. Nursery.

As noted under Docentry (p. 200), arrangements may be made for viewing the plantations under guidance. They are open free to the public daily from 8 a.m. until dusk; on Sundays and holidays from 10 a.m. until dusk.

Automobiles.—Automobiles are not regularly admitted to the Garden. On application to the Director special permits for automobiles are issued, *to members only,* to enable those who may not be able to walk through the plantations to enjoy the Garden. Arrangements must be made in advance (preferably one day in advance). *In every case the car must be accompanied by a representative of the Garden.*

Systematic Section

The main part of the outdoor plantations is devoted to the Systematic Section, which extends from north to south through the central part of the Garden. Here the plants are grouped according to their botanical relationships, in orders, families, and genera, following approximately the Engler system of plant classification. From the simpler and more primitive types of plants at the north end, to the more highly developed groups at the south, the Sys-

tematic Section comprises representative members of the families of plants which are hardy or semi-hardy in this climate. In accordance with this arrangement, the ferns and the conifers and other gymnosperms are at the northern end. Then follow the trees, shrubs, and herbaceous plants of the various families of dicotyledons. Along the east side of the Brook are the polypetalae. Along the west side of the Brook are the monocotyledons (north of the Rock Garden), and the sympetalae (south of the Rock Garden). The catkin-bearing trees and shrubs follow the line of the Brook. Wherever possible, the plants chosen to represent their groups are those which are of interest from both botanical and horticultural points of view.

Local Flora Section

This is an area of about two acres devoted to plants native within approximately 100 miles of Brooklyn (the Torrey Botanical Club range). The following ecological units are represented: bog, sand barren, pond, meadow, and woodland. Nearly all the native plants of general interest are well established here, with the exception of the ferns inhabiting limestone areas. There is as yet no suitable place for these. Although the section is not yet open to the general public, arrangements may be made with the *Curator of Public Instruction* for its inspection by botany classes, to whose needs this area is especially adapted.

Japanese Garden

The Japanese Garden, first opened to the public in 1915, was made possible by a gift to the Botanic Garden of $12,500 from Mr. Alfred T. White, "the father of the Botanic Garden." The design, by the Japanese landscape architect, Mr. Takeo Shiota, carries out faithfully the Japanese idea of a *Niwa*, or landscape garden. From the tea house (near the east entrance) one can see the *machiai* or "rest house," the island with the drum bridge, bronze storks, stone and wooden lanterns, the waterfalls, and the wooden Torii standing in the lake, recalling the one at Miyajima, Japan. Since January 1, 1919, this Garden has been in charge of Miss Mary Averill, honorary curator of Japanese gardening and

floral art, and has been steadily improved, under her supervision, by Japanese gardeners. For details and explanations of the meaning of the various features see "The Japanese Garden of the Brooklyn Botanic Garden": Guide No. 4. (*Brooklyn Botanic Garden Record* **19:** 197–234. July, 1930.) Out of print, but available in libraries.

Rock Garden

The Rock Garden, constructed in the spring of 1916, is, in point of time, perhaps, the first rock garden of any considerable size in a public garden or park in the United States. The rocks used in its construction are glacial boulders which were uncovered in the course of grading operations on other parts of the grounds; they are the only "native" rocks on Long Island, with the exception of one small outcrop on the northwest shore. The general idea in making the garden was that of representing a boulder-strewn slope, but this design, of necessity, was modified in places to provide proper cultural conditions as to drainage, depth of soil, and shade. The garden is planted with about eight hundred species and varieties of alpine, saxatile, and other plants suitable for rock garden culture.

Although the rock garden enthusiast may expect to find something of interest in bloom during every month of the year, it is in April, May, and June that the Rock Garden provides its greatest display of blossoms. In several years there have been flowers in bloom in the Rock Garden in each of the twelve months. Persons interested in rock gardening will find Guide No. 5, *The Rock Garden of the Brooklyn Botanic Garden,* helpful; also, *Leaflets,* Series XI, No. 6, *The Rock Garden.*

Conservatory Plaza and Waterlily Pools

The initial development of the Conservatory Plaza and Waterlily Pools, including the paved walks, eight stone seats, four herbaceous borders, south pool for hardy waterlilies, and north pool for sub-tropical and tropical forms, was due to a gift to the Botanic Garden of $19,260 in 1919 and 1920 from Mr. Alfred T. White. The south pool contains 26 hardy species, and the north

(heated) pool 42 tender species. For the latter the Garden is indebted to the perennial generosity of William Tricker, Inc., Saddle River, New Jersey.

Rose Garden

The Rose Garden, occupying about one acre in the northwest part of the Botanic Garden, was formally opened to the public on Sunday afternoon, June 24, 1928. This garden was made possible by a gift of $15,000 from Mr. and Mrs. Walter V. Cranford, of Greenwich, Connecticut.

The general plan of the Garden is as follows: At the north end, entrance is gained through a Doric pergola. Three parallel rows of beds extend to the southward from the pergola, as far as the pavilion. In the central row of beds, varieties of hybrid perpetuals have been planted along with many of the small polyantha type; each of the two side rows contains varieties of hybrid teas. In the arrangement of these varieties the older forms appear at the beginning, near the pergola, the most recent productions near the pavilion, with the intermediate forms in chronological sequence between. Varieties of pillar and post roses are planted at regular intervals, on suitable supports, in the beds, with standards between the beds of the side rows. The trellis surrounding the garden, and also the pergola and pavilion, furnish support for climbing roses, while the marginal beds along the trellis are for wild species and their derivatives. South of the pavilion, three additional beds are devoted to historical roses, *i.e.*, those mentioned in ancient literature, and to roses of commercial use.

The Rose Garden is open to the public from 9 a.m. to 5 p.m. on weekdays (except holidays) during the rose season, and from 10 a.m. to 7 p.m. in June. Children are admitted only when accompanied by responsible adults.

Flower Days

In order to afford members of the Garden and friends whom they may invite, an opportunity to see, under expert guidance, some of the most conspicuous and interesting floral displays of the Garden; to assist them toward solving some of their own gar-

dening problems; and to enable them to meet for discussion, a series of special days, called Flower Days, was inaugurated in 1927. The dates selected are those in which the particular flowers furnishing the theme for discussion are in their prime. Up to and including 1935 the following "Days" have been observed:

Crocus Day	Rose Garden Day (June)
Daffodil Day	Japanese Iris Day
Tulip Day	Water Garden Day
Rock Garden Day	Fall Rose Garden Day
Japanese Garden Day	Canna Day
Iris Day	Chrysanthemum Day

On each of these occasions a specialist gives an illustrated talk on the flower of the Day, followed by a tour of inspection of the flowers in bloom on the grounds of the Garden. The speakers are either members of the Garden staff who have made a special study of the flowers in question, or invited experts in their breeding or culture. During the outdoor inspection there is free discussion of questions of desirable varieties, culture, disease, etc. On returning to the Laboratory Building, tea is served. The exercises commence at 3:30 p.m.

These Flower Days, now an established feature of the Garden's activities, have come to be of more than local interest. In 1934 the Botanic Garden's "Rock Garden Day" was the occasion of the first annual meeting of the American Rock Garden Society. Similarly, in other years, the American Iris Society and the American Rose Society have held their meetings at the Garden and have joined with the Garden members in the celebration of their respective Flower Days.

Conservatories

The Garden conservatories contain a collection of tender and tropical plants. Of special interest for teachers of nature study and geography are the following useful plants from the tropics and subtropics: banana, orange, lemon, lime, kumquat, tamarind, West Indian cedar (the source of the wood used for cigar boxes), eucalyptus, Manila hemp, sisal, pandanus (source of the fiber used for making certain kinds of fiber hats), fig, grapevines from north

and south Africa, date palm, coconut palm, chocolate tree, coffee, tea, ginger, bamboo, mahogany, balsa, cocaine plant, black pepper, annatto (used in coloring butter and cheese), cardamom, olive, pomegranate, logwood, durian, mango, sugar cane, avocado (so-called "alligator pear"), West Indian and other rubber plants, banyan, religious fig of India, and numerous others.

It may be of interest to teachers of botany that the nine extant genera of cycads are represented in House 12. To reach the Cycad House take the first door to the *left* after entering the central or Economic House and pass through to the end house.

The Conservatories are open April 1 to October 31, 10 a.m.–4:30 p.m. (Sundays, 2–4:30); November 1 to March 31, 10 a.m.–4 p.m. (Sundays, 2–4).

Herbarium

The Garden herbarium consists at present of about 200,000 specimens, including phanerogams, ferns, mosses, liverworts, lichens, parasitic and other fungi, algae, and myxomycetes. This collection may be consulted daily (except Sundays and holidays) from 9 a.m. until 5 p.m., Saturdays from 9 a.m. to 12 m. Specimens submitted for identification will be gladly received. Address the *Curator of the Herbarium*.

Library

The rapidly growing library of the Garden comprises at present more than 18,600 volumes and about 15,000 pamphlets. This is not a circulating library, but is open free for consultation to all persons daily (except Sundays and holidays) from 9 a.m. until 5 p.m. (Saturdays, 9 to 12). Nearly 1,000 periodicals and serial publications devoted to botany and closely related subjects are regularly received. These include the transactions of scientific societies from all quarters of the globe; the bulletins, monographs, reports, and other publications of various departments of the United States Government, as well as those of foreign governments, and of all state agricultural experiment stations and agricultural colleges; the publications of research laboratories, universities, botanic gardens, and other scientific institutions of the world,

as well as the files of independent journals devoted to the various phases of plant life. The library is specially rich in publications of foreign countries and has a growing collection of incunabula and other pre-Linnean works.

Bibliographical assistance is rendered to readers by members of the Library staff.

An annotated list of the incunabula, pre-Linnaean works, old herbals and other rare or historically important books in the Library was published as the July, 1935, number of the Botanic Garden RECORD. Copies are for sale at 40 cents each.

Laboratory Building

The Laboratory Building contains (besides offices of administration and the Library and Herbarium mentioned above) four laboratory rooms, a culture room, three classrooms with stereopticon and other equipment for instruction, a room for the installation of temporary exhibits, six private research rooms, and an auditorium seating about 570 and equipped with motion picture machine, stereopticon, and lecture table supplied with water, gas, and electric current for lectures involving experimental work.

Instructional Greenhouses

A range of three greenhouses, each about 20 x 30 feet, is provided for the practical instruction of children and adults in plant propagation and other subjects.

Children's Room

A gift of $1,500 in 1921 from Mrs. Helen Sherman Pratt, supplemented in 1923 by a further gift of $500 from Mr. George D. Pratt, has made it possible to provide a beautifully decorated room for the use of the Boys' and Girls' Club. Any boy or girl who is enrolled, or has been enrolled, in any of the children's classes at the Garden is eligible for membership in this club, which now numbers about 1,000 active members. The room contains shelves for a nature-study library, of which a nucleus has already been secured, and is equipped with stereoscopic views, photographs, and preserved and living specimens of plant life, for the instruction

and entertainment of boys and girls. The room is open free to all children. Contributions of specimens and of books on nature study and closely related subjects will be most welcome.

Children's Building

This is located in the northern part of the Children's Garden plot and contains a conference room, and rooms for the storage of garden tools and implements. The furniture in the conference room was a gift from Mrs. James H. Post. Various collections of plants, seeds, and insects of economic importance in the garden are accessible here for consultation by the children. A garden library, a gift of friends, has been added. North of the Children's Building is a plot planted to ornamental shrubs and herbaceous perennials for the instruction of the children.

Children's Garden

A plot of about three-quarters of an acre in the southeast part of the Botanic Garden is devoted to the theoretical and practical instruction of children in gardening. The larger part of this area is laid out in garden plots which will accommodate about 200 children. At the south end is a Shakespeare Garden, given by Mrs. Henry W. Folger.

Non-Botanical Educational Features

Meridian Panel.—In 1931 there was placed in the paved walk in front of the main west entrance to the Laboratory Building a Terrestrial Position Panel, briefly referred to as the "Meridian Panel." This panel, of black Belgian marble terazzo, is 21 feet, 2 inches long, and 5 feet wide. It contains a brass strip, 20 feet long and ⅞ inch wide, laid along the geographical meridian, the location of which was accurately determined by Mr. Weld Arnold, then of the School of Surveying of the American Geographical Society, but now of the School of Geography, Harvard University.

Another brass strip, 18½ feet long and ⅝ inch wide, marking the magnetic meridian, crosses the geographical meridian at an angle of 11° 11′. The data at the ends of the meridians are as follows:

At the North End:
Magnetic north. Variation 11° 11′ west in 1931
Annual increase 4′
At the South End:
Altitude above mean sea level, 115 feet
North latitude, 40° 40′ 06″
Longitude west of Greenwich, 73° 57′ 48″
To the North Pole, 3416.7 miles
To the Equator, 2798.2 miles

This feature is proving of much public interest, and the data are constantly being copied by school classes and others.

Armillary Sphere.—The central feature of the Laboratory Plaza is the large Compass and Armillary Sphere erected in 1933. This was made possible through a bequest of the late Alfred W. Jenkins, a former member of the Botanic Garden Governing Committee. The Armillary Sphere consists of circular bands of bronze representing the principal celestial circles, and has been designed to serve also as a sun dial. Strictly, an armillary sphere should have either the earth or the sun represented in its center, but here, in order to make it serve as a sun dial, these are omitted, and a slender metal rod, extending from the south to the north pole of the sphere, serves as a gnomon. From the shadow thrown by this rod the correct sun time is indicated on a dial on the inner surface of the equatorial band. By means of the "Equation of Time" inside the sphere, this can be changed to Standard Time. The signs of the zodiac are to be seen on the outside of this broad band (as the band of the ecliptic where they are usually placed is too narrow to receive them): they were modelled by Miss Rhys Caparn, sculptor. The north pole points to the North Celestial Pole. The sphere is mounted on a pedestal of Carver black granite from Vinal Haven, Maine. A bronze band encircling the pedestal bears the following classic sun dial motto:

"Serene I stand amyddst ye flowres
To tell ye passing of ye howres."

The pedestal rests on an octagonal platform of Stony Creek (Connecticut) pink granite, and the whole is mounted at the center of a large circular compass paved with marble terrazzo in four colors,

each color representing a different point of the compass. The marble chips used in the terrazzo are of various origins, the red marble coming from Massa, Italy, the black from Mazy, Belgium, the green from Cardiff, Maryland, and the yellow from Siena, Italy. The armillary sphere (with pedestal) and the compass, as well as the entire Plaza, were designed by Mr. Harold A. Caparn, landscape architect of the Botanic Garden.

Labeled Boulders.—The Brooklyn Botanic Garden is located near the western end of the terminal moraine of Long Island. This moraine was deposited at the southern edge of the continental glacier that occupied the northern part of North America, during the last Ice Age. The southward-moving ice picked up and carried along innumerable boulders derived from rock ledges in various localities north of what is now Long Island. During their journey, these boulders were rounded and polished and, in some cases, marked with striations that still persist. Twenty-eight of these boulders have had their lithological composition carefully determined and compared with that of rock ledges to the north. By this study it has been possible to determine, with a fair degree of accuracy, the approximate places from which the boulders now in the Botanic Garden were derived. Bronze tablets, given by President Edward C. Blum, of the Board of Trustees, have been placed on these boulders, telling their composition and probable place of origin, and stating that they were brought to the Garden by the continental ice-sheet during the glacial period.

A similar bronze tablet is mounted on a boulder at the foot of Boulder Hill (which takes its name from the large glacial erratic on its summit). The inscription reads, "Boulder Hill and the entire northern portion of the Botanic Garden are part of the terminal glacial moraine extending from The Narrows to Montauk Point. This tablet was given in 1932 by the Boys' and Girls' Club of the Brooklyn Botanic Garden."

Guide No. 7, *The story of our boulders,* has been prepared for the use of classes in geography or geology, or others who may be interested. Copies may be obtained at the Information Desk and Entrance Gates at 35 cents each; by mail, 40 cents. Arrangements may be made in advance for docents to conduct classes who wish to study these labeled boulders.

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9–6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 68. Monographic Studies in Eleocharis—III. 13 pages. 1934.

No. 69. Plants of the Astor Expedition, 1930 (Galapagos and Cocos Islands). 61 pages. 1935.

No. 70. Inheritance of resistance to loose smut in hybrids of Fulghum and Black Mesdag oats. 10 pages. 1935.

No. 71. Physiologic specialization of the parasitic fungi. 19 pages. 1935.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 5. The Rock Garden. 28 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 53 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.